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U.S. CHEMICAL INDUSTRY STATISTICAL HANDBOOK

CMA
CHEMICAL MANUFACTURERS ASSOCIATION

BEST AVAILABLE COPY

U.S. Chemical Industry Statistical Handbook

1992

CHEMICAL MANUFACTURERS ASSOCIATION
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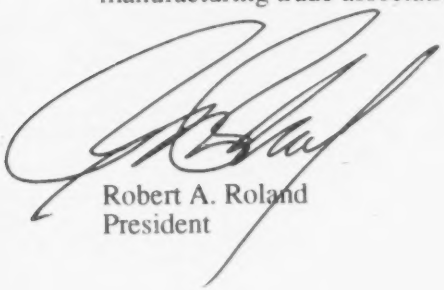
Introduction

September, 1992

This is the third edition of the Chemical Manufacturers Association's "U.S. Chemical Industry Statistical Handbook". The objective of this publication, which is updated annually, is to provide an economic profile of the U.S. chemical industry and a comprehensive source of economic and other data about the industry.

We want this Handbook to meet industry and public needs. Suggestions for improvement will be welcomed.

The Chemical Manufacturers Association (CMA) is a nonprofit trade association whose member companies account for more than 90 percent of the basic industrial chemical productive capacity in the United States. Founded in 1872, CMA is the oldest manufacturing trade association in the Western Hemisphere.



Robert A. Roland
President

Technical Notes and Acknowledgements

Unless otherwise noted, all statistical data are drawn from official U.S. government sources.

Data sources are noted at the bottom of each table. Lack of space precludes inclusion in this publication of all notes concerning methods and sources which were included in the original statistical sources. For required detail users may find it necessary to consult the original source.

Many time series go through several revisions. Thus, data for recent years may be preliminary and subject to later revisions.

The abbreviation n/a indicates that data was not available at the time of preparation of the series concerned.

The sum of individual data points within a table may not add to the indicated total due to independent rounding.

CEFIC is the acronym for the "Conseil Europe'en des Federations de Industrie Chimique", the European chemical industry association, a data source utilized in this publication.

WMTDB is the acronym for the "World Manufactures Trade Data Base," a data base created at CMA to allow assessments of world manufactures trade flows.

Every effort has been made in the preparation of this publication to provide the best available information. However, CMA cannot be responsible for the accuracy of individual statistics.

This publication was prepared by the Trade and Economics Division of the Federal Government Relations Department of CMA. The cooperation of many contacts in government and other organizations is gratefully acknowledged.

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Responsible Care:®
A Public Commitment

RESPONSIBLE CARE® CODES

The six Responsible Care®codes set performance objectives that encourage commitment, innovation, and continual improvement in health, safety, and environmental performance.

RESPONSIBLE CARE®

THE CHEMICAL INDUSTRY'S COMMITMENT TO THE PUBLIC

In September, 1988, the Board of the Chemical Manufacturers Association (CMA) adopted Responsible Care® - a voluntary initiative to continuously improve performance in health, safety and environmental quality. This improvement is achieved through implementation of six codes that set performance objectives. Participation in Responsible Care® is an obligation of membership - all CMA member companies must sign its Guiding Principles, implement its codes, and subscribe to the philosophy of continuous improvement and public involvement.

CMA's members account for 90% of the productive capacity for industrial chemicals in the United States. Since chemicals manufactured by CMA members touch almost every American's lifestyle, the ultimate impact of Responsible Care® is practically universal.

The broad scope of Responsible Care® covers the entire life cycle of the chemical process.

Codes of Management Practices - Responsible Care® codes are performance objectives that encourage commitment, innovation and continual improvement. They are at the heart of the initiative, going far beyond the requirements of current law. Codes on Community Awareness and Emergency Response, Pollution Prevention, Process Safety, Distribution, Product Stewardship and Employee Health and Safety are being implemented. The goal of Responsible Care® is long-term significant improvement in the industry's environmental, health and safety performance.

Public Involvement - Through a national citizen advisory panel, and an extensive national dialogue program, the public is directly involved in helping to shape the initiative. The initiative is now embedded in the management process of the association, directly affecting its decisions about policy, positions and programs. The national citizen advisory panel acts as a sounding board for public concerns and is made up of a cross section of environmental, health and safety thought leaders. Panel members directly shape the initiative by reviewing proposed Codes of Management Practices, and suggesting ways for industry to respond to public concerns. Member companies are also strongly encouraged to form community advisory panels. The key to success is an open dialogue with the public. Through Responsible Care® the chemical industry is establishing this dialogue.

Performance Measures - Effective performance evaluation is a critical element of Responsible Care®. Each code has an evaluation procedure form that requires every company, annually, to assess in a prescribed format and report to CMA where they stand with implementing each element for each code. The evaluations track the collective progress of CMA members. Many companies are using total quality programs and measures to implement Responsible Care®.

The Responsible Care® initiative is having a significant impact on the culture and performance of the industry. Two examples:

- Members have reduced industry-wide emissions to air, land and water by 35% over the past four years. This has come at a time of 10.1% increased production and a growing contribution ($18.8 billion in 1991) to the U.S. trade balance.

- Fully 95% of CMA members invited to participate in EPA's 1991 voluntary pollution control program -- a voluntary commitment to lowering certain emissions -- agreed to do so.

CMA's members are demonstrating continual progress in lowering emissions, reducing transportation accidents and incidents, improving emergency response, and, most important, opening and maintaining a dialogue with people in the communities where they run their operations.

What Is The Chemical Industry?

The chemical industry takes natural raw materials from earth, water, and air and converts them into valuable products tailor-made for consumers and the nation's industries (Figure A). The chemical industry's products have many applications:

- ❑ raw and basic materials for other industries;
- ❑ intermediate materials for other industries; and
- ❑ a wide variety of finished products for industry, agriculture, business and individual consumers.

Unlike most other industries, the chemical industry does not make one group or family of products derived from only a few key materials. It makes more than 60,000 chemical products from a vast array of metals, minerals, coal, oil, natural gas, vegetable oils, animal fats, and other raw materials.

Products of the chemical industry are pervasive, as shown in figures A-M; very few goods and services are produced in modern industrial societies without some input from the chemical industry. Chemicals are thus a "basic" industry that supplies every level of production and consumption. That is, it makes not only a wide variety of consumer goods, but products that are building blocks essential to our agricultural, construction, manufacturing, and service industries.

Synthetic fibers and permanent-press clothing, improved medicines, pharmaceuticals, health improvement products, better protective packaging materials, longer-lasting paints, stronger adhesives, more durable and safer synthetic tires, lighter-weight plastic automobile parts, and stronger composite materials in advanced aircraft and spacecraft are only a few of the thousands of the chemical industry's constant stream of new and innovative products.

The chemical industry is a keystone of the U.S. economy. On a value added basis it is about 8 percent of U.S. manufacturing and produces about 1.7 percent of U.S. GNP. Despite its keystone stature and the enormous range of its products, the size, nature and critical contributions of the chemical industry to the economy are not highly visible, probably because most chemical companies are not directly involved in the production of consumer products.

The charts which follow provide a simplified overview of some key parts of the chemical production chain, from raw material inputs to valued outputs.

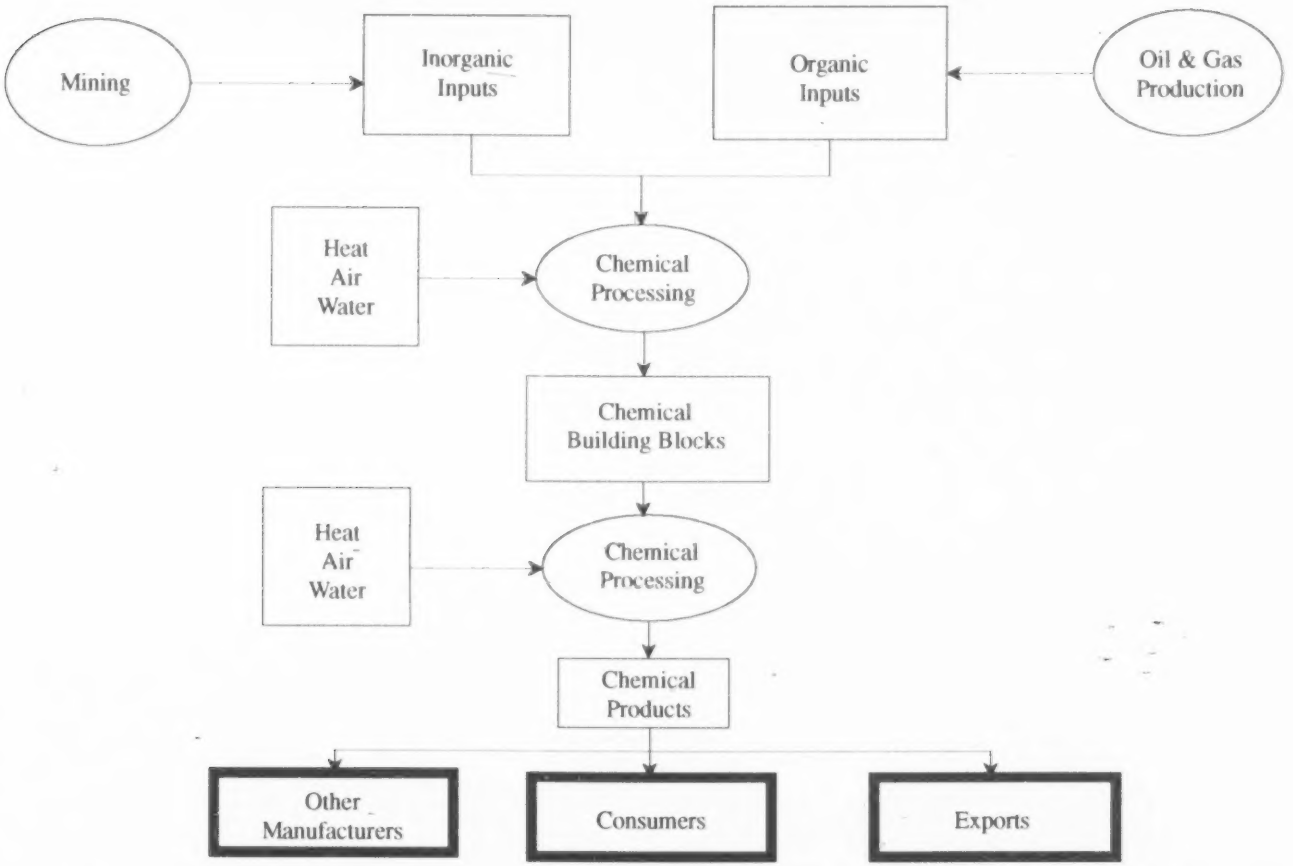
There are two kinds of chemistry, organic and inorganic. Organic inputs, like oil and natural gas, contain hydrocarbons which form the backbone of final organic chemical outputs. In the first stage of processing (Figure B) raw materials are refined to produce primary outputs like benzene and ethylene. Primary outputs like these are the building blocks of the chemical industry. In subsequent processing (Figures C-J) chemicals such as chlorine are added to the hydrocarbon backbones to give the compounds certain desired characteristics. The final output may, for example, be nylon or polyester fiber, plastic, a pharmaceutical product, or other products often not thought of as chemical industry outputs.

Inorganic inputs are often compounds composed of the 107 natural elements of the earth (Figure K). Salt -- a simple compound formed from sodium (Na) and chlorine (Cl) -- can be broken down by electrolysis to produce chlorine and caustic soda (sodium hydroxide). Chlorine (Figure M), a common inorganic chemical, is used both by industries and consumers. The paper industry, for example, uses chlorine to bleach pulp and consumers may appreciate it as a means of keeping their clothes white and their drinking water safe. Caustic soda is another inorganic chemical used extensively in manufacturing processes and in the production of soaps and detergents.

The figures which follow do not attempt to report all chemical products and processes. The vast spectrum of chemical outputs makes it impractical to describe more than a few simple process chains.

Figure A:

What Is Chemistry?



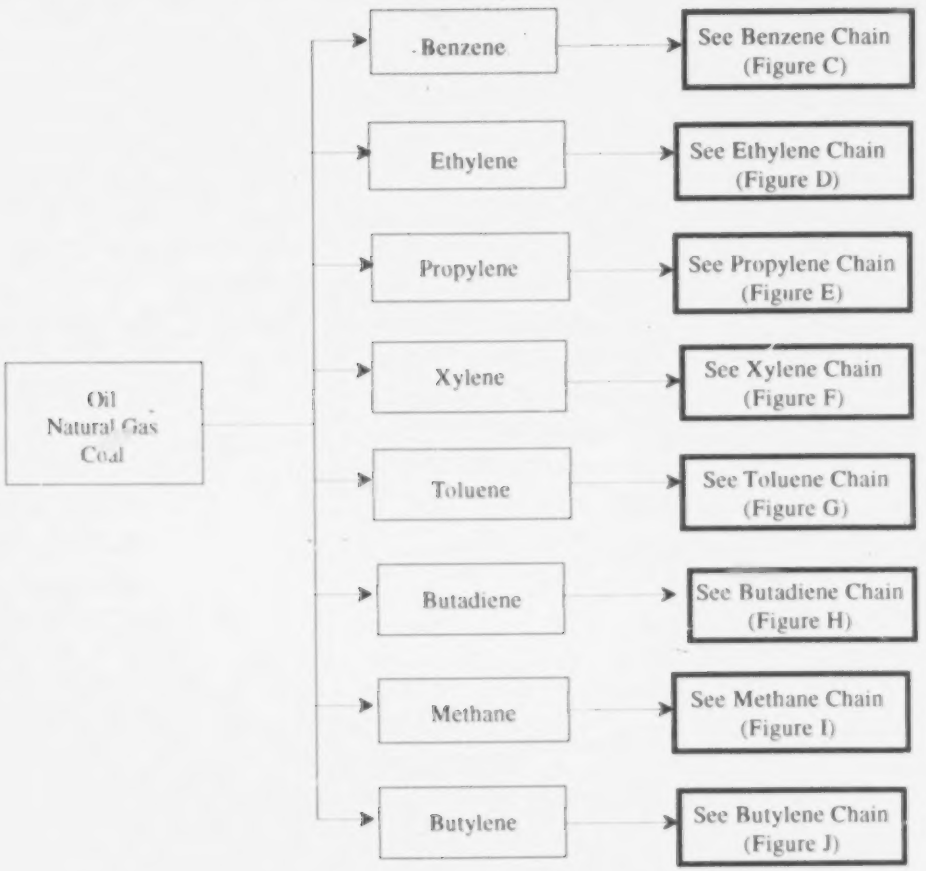
❑ Chemistry combines organic and inorganic materials from the earth with heat, air, and water to make products useful in modern civilization.

❑ Organic chemicals begin with raw materials containing hydrocarbons such as oil, natural gas, and coal.

❑ Inorganic chemicals do not contain carbon but are made from ores taken from the earth, such as salt. Compounds such as salt are a combination of elements that are listed in the "Periodic Table of Elements" (Figure K)

Figure B:

Organic Chemical Chain



❑ The organic chemical inputs -- oil, natural gas, and coal-- yield eight basic, first level derivative chemicals. Some examples of products resulting from further processing of each of these eight first level chemicals are shown in figures C through J.

Figure C:

Benzene Chain

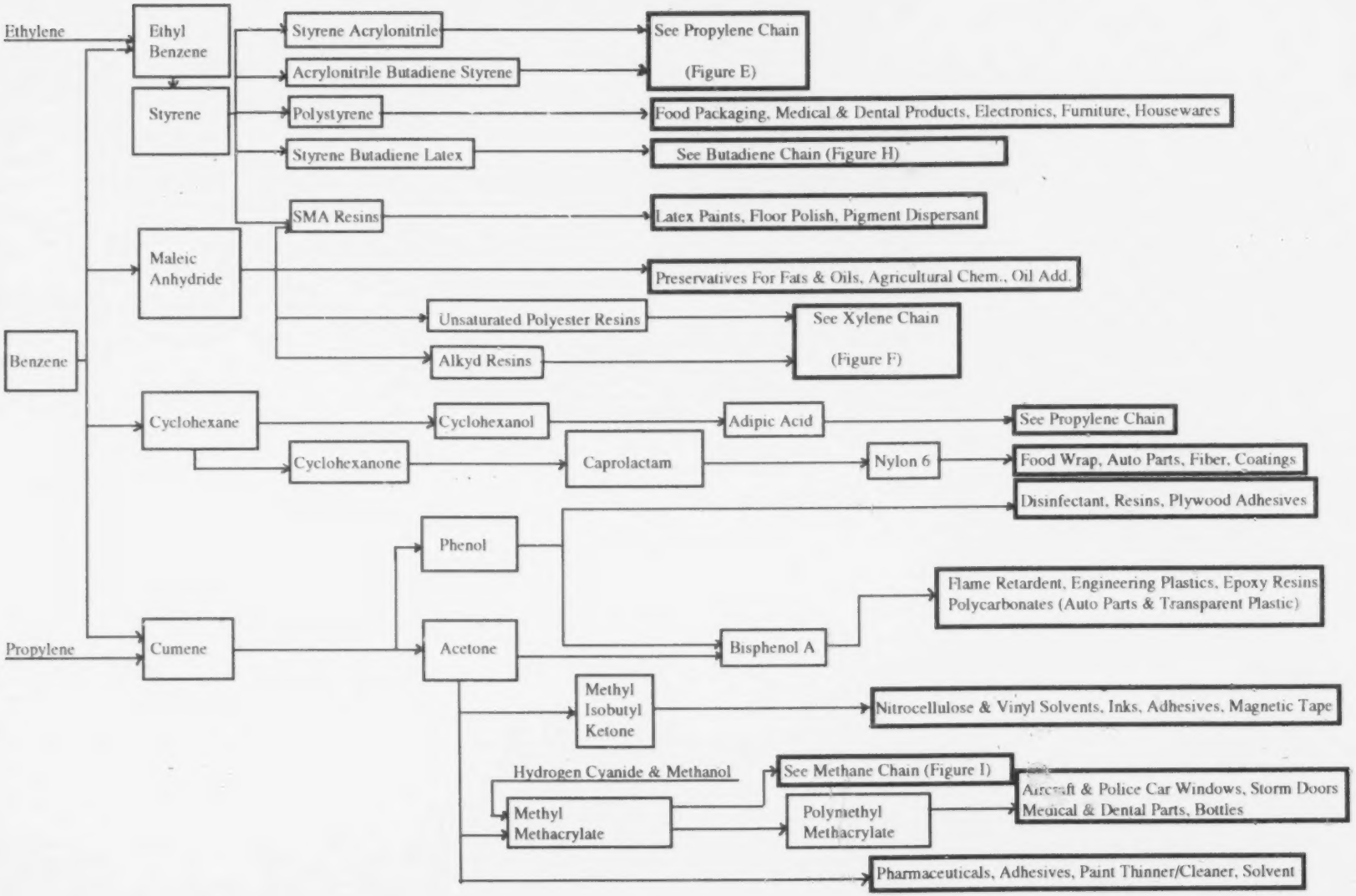


Figure D:

Ethylene Chain

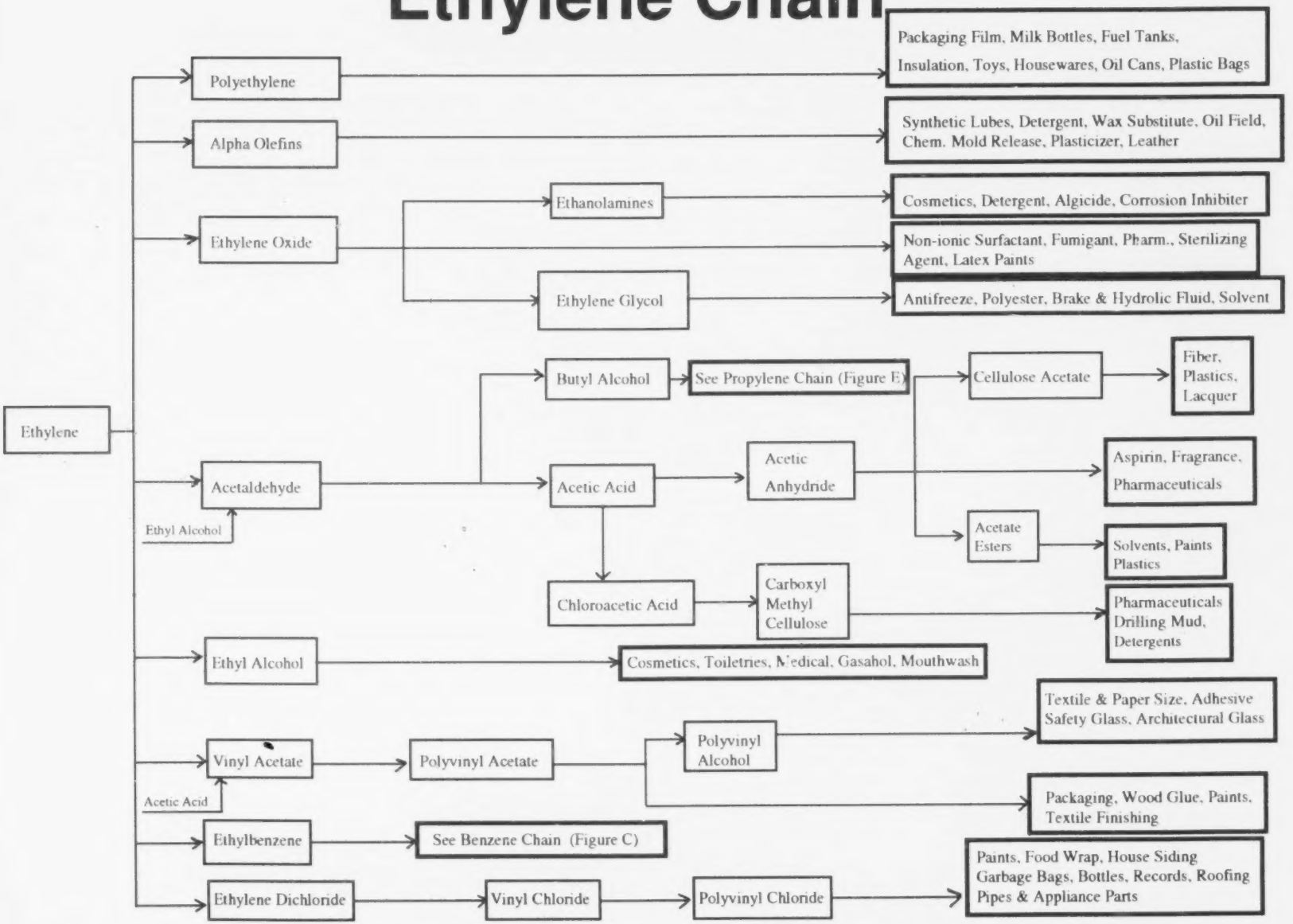


Figure E:

Propylene Chain

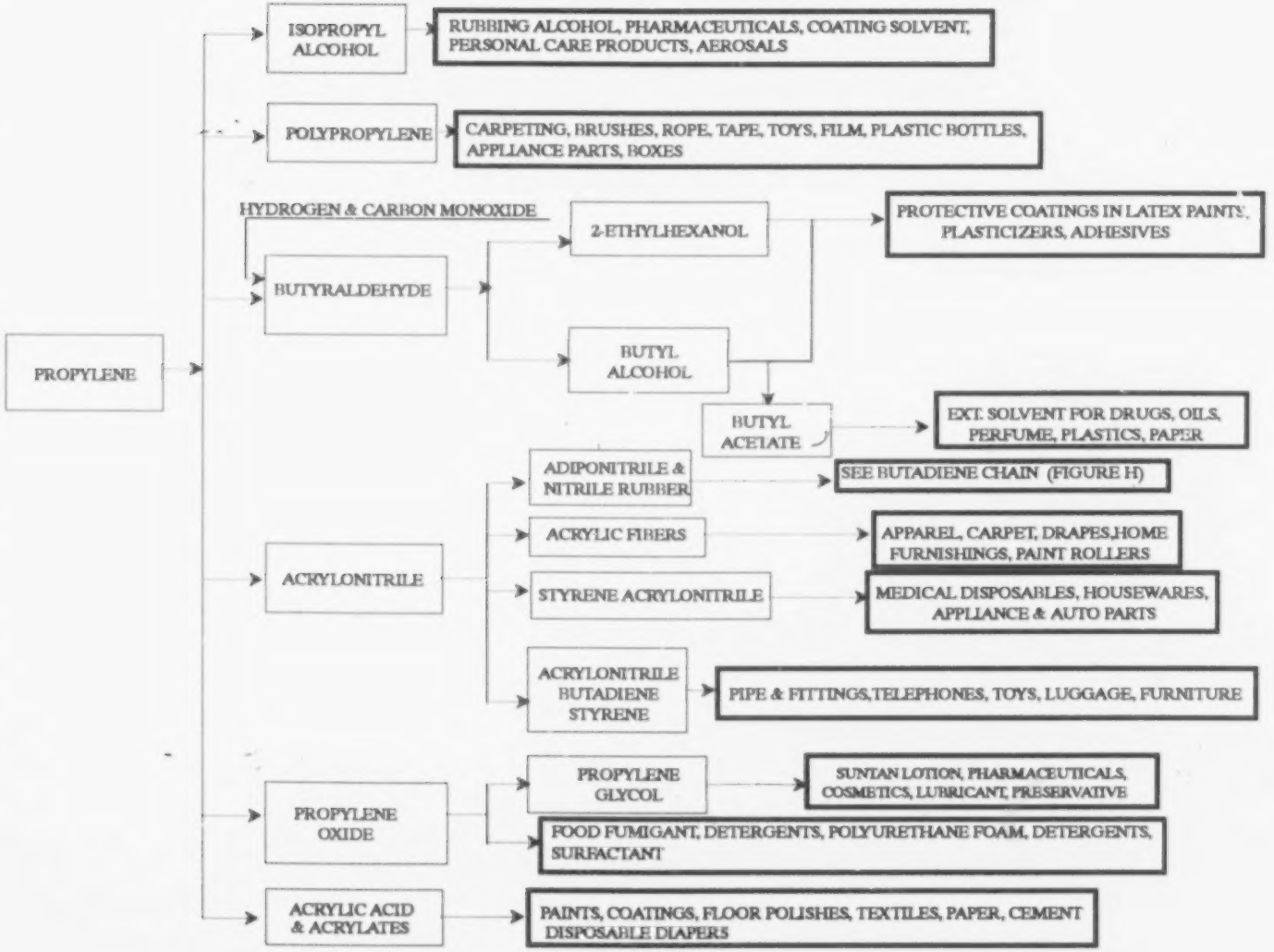

PROPYLENE
ISOPROPYL ALCOHOL
RUBBING ALCOHOL, PHARMACEUTICALS, COATING SOLVENT, PERSONAL CARE PRODUCTS, AEROSALS
POLYPROPYLENE
CARPETING, BRUSHES, ROPE, TAPE, TOYS, FILM, PLASTIC BOTTLES, APPLIANCE PARTS, BOXES
HYDROGEN & CARBON MONOXIDE
BUTYRALDEHYDE
2-ETHYLHEXANOL
PROTECTIVE COATINGS IN LATEX PAINTS, PLASTICIZERS, ADHESIVES
BUTYL ALCOHOL
BUTYL ACETATE
EXT. SOLVENT FOR DRUGS, OILS, PERFUME, PLASTICS, PAPER
ACRYLONITRILE
ADIPONITRILE & NITRILE RUBBER
SEE BUTADIENE CHAIN (FIGURE H)
ACRYLIC FIBERS
APPAREL, CARPET, DRAPES,HOME FURNISHINGS, PAINT ROLLERS
STYRENE ACRYLONITRILE
MEDICAL DISPOSABLES, HOUSEWARES, APPLIANCE & AUTO PARTS
ACRYLONITRILE BUTADIENE STYRENE
PIPE & FITTINGS,TELEPHONES, TOYS, LUGGAGE, FURNITURE
PROPYLENE OXIDE
PROPYLENE GLYCOL
SUNTAN LOTION, PHARMACEUTICALS, COSMETICS, LUBRICANT, PRESERVATIVE
FOOD FUMIGANT, DETERGENTS, POLYURETHANE FOAM, DETERGENTS, SURFACTANT
ACRYLIC ACID & ACRYLATES
PAINTS, COATINGS, FLOOR POLISHES, TEXTILES, PAPER, CEMENT DISPOSABLE DIAPERS

Figure F:

Xylene Chain

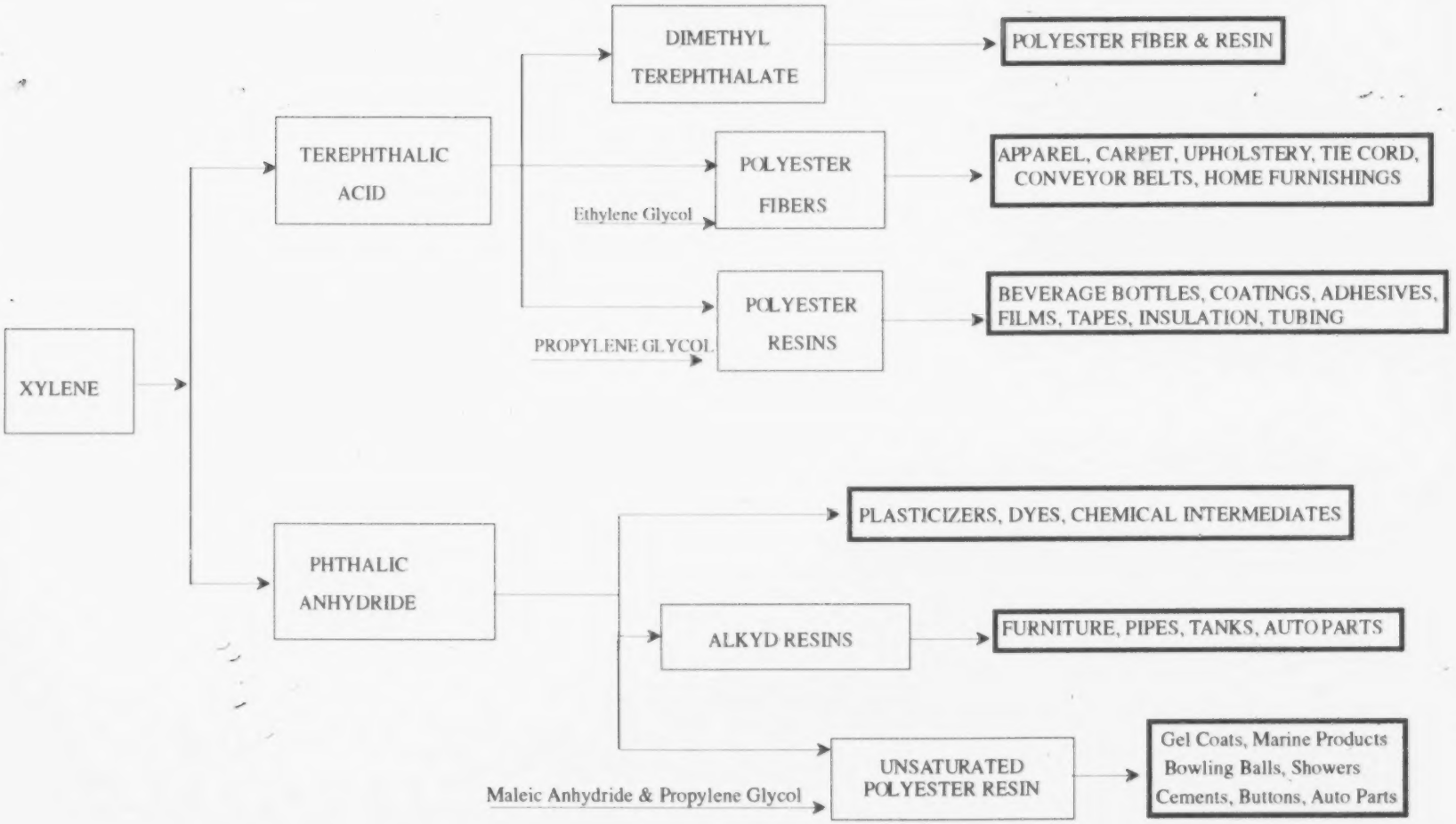


Figure G:

Toluene Chain

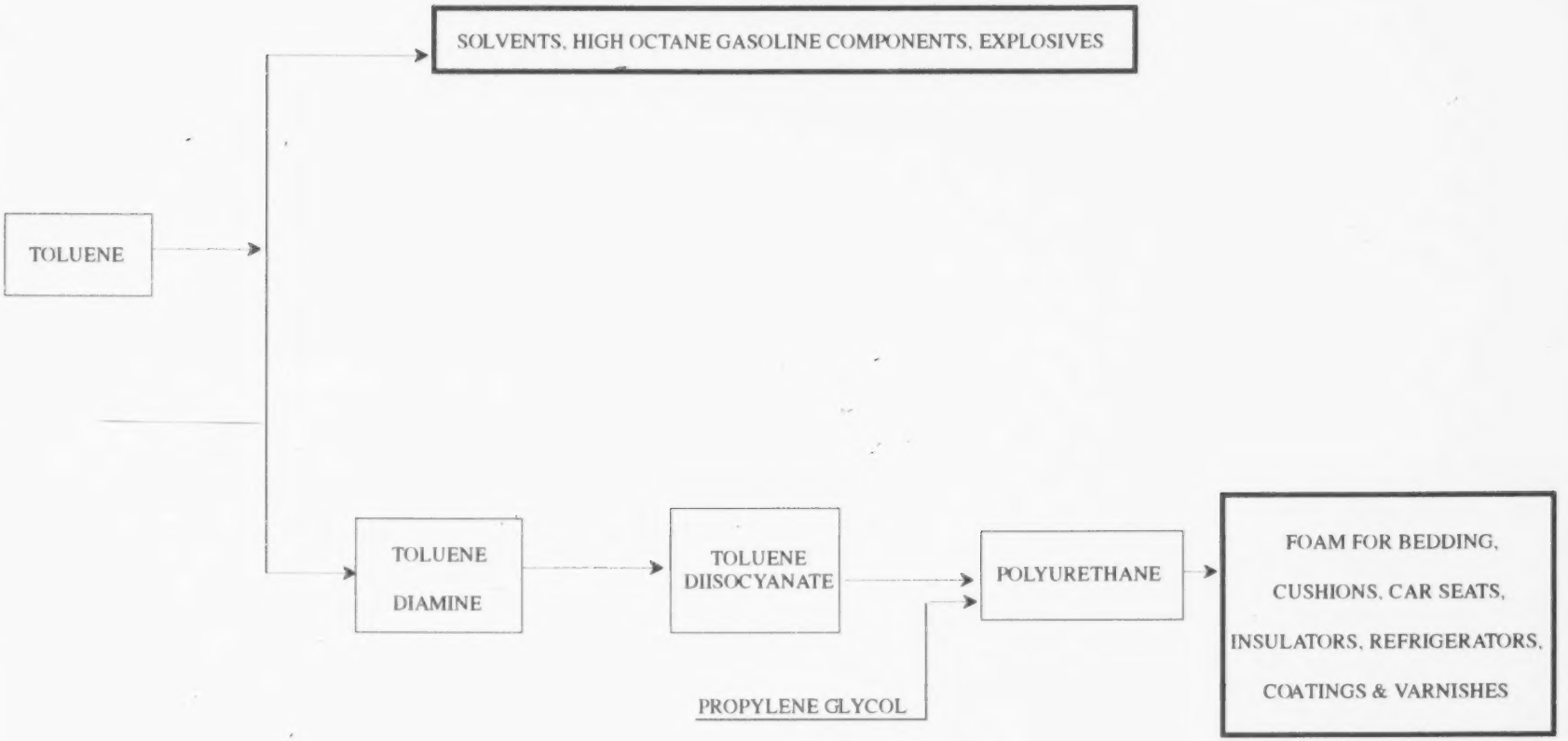


Figure H:

Butadiene Chain

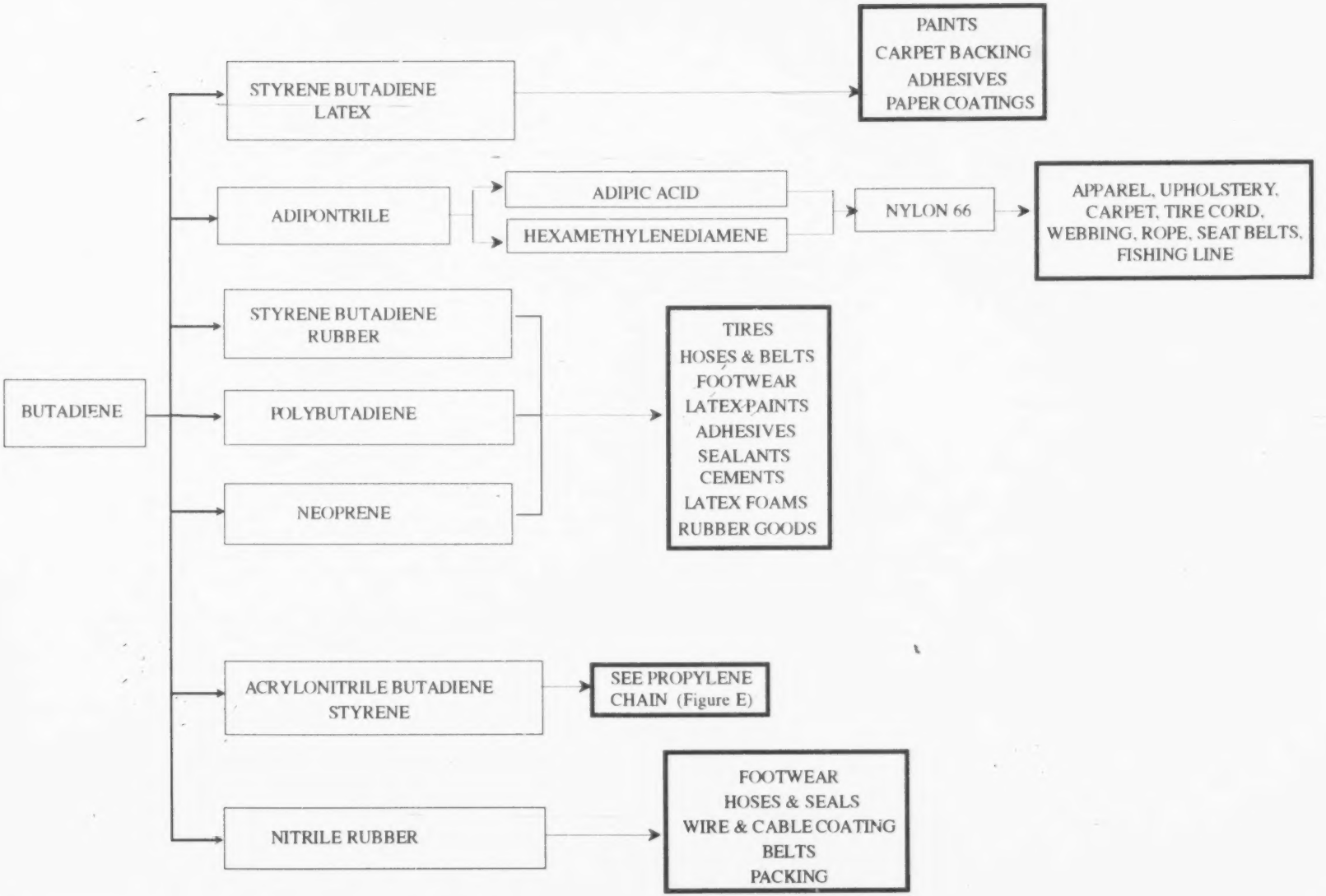


Figure I:

Methane Chain

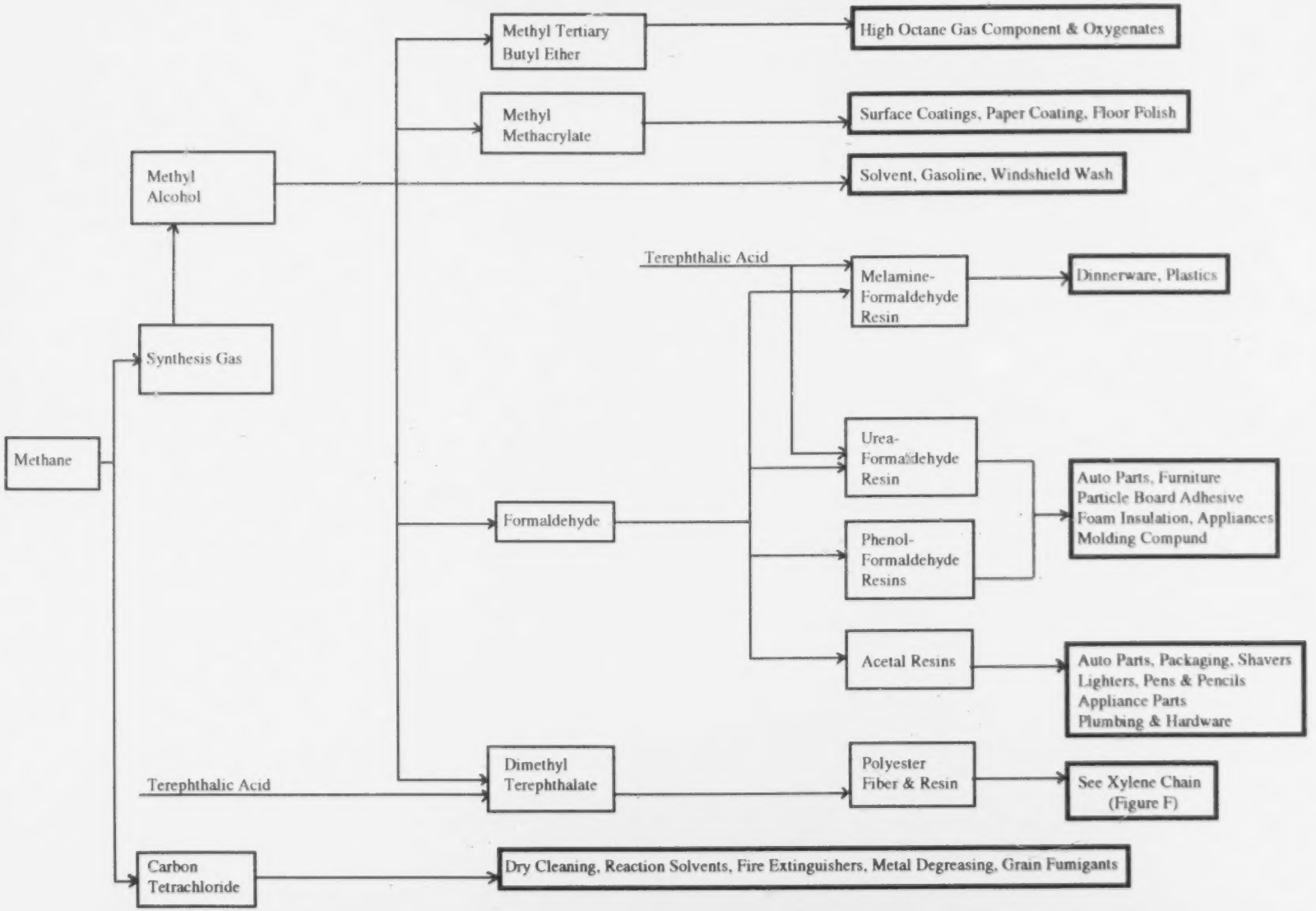


Figure J:

Butylenes Chain

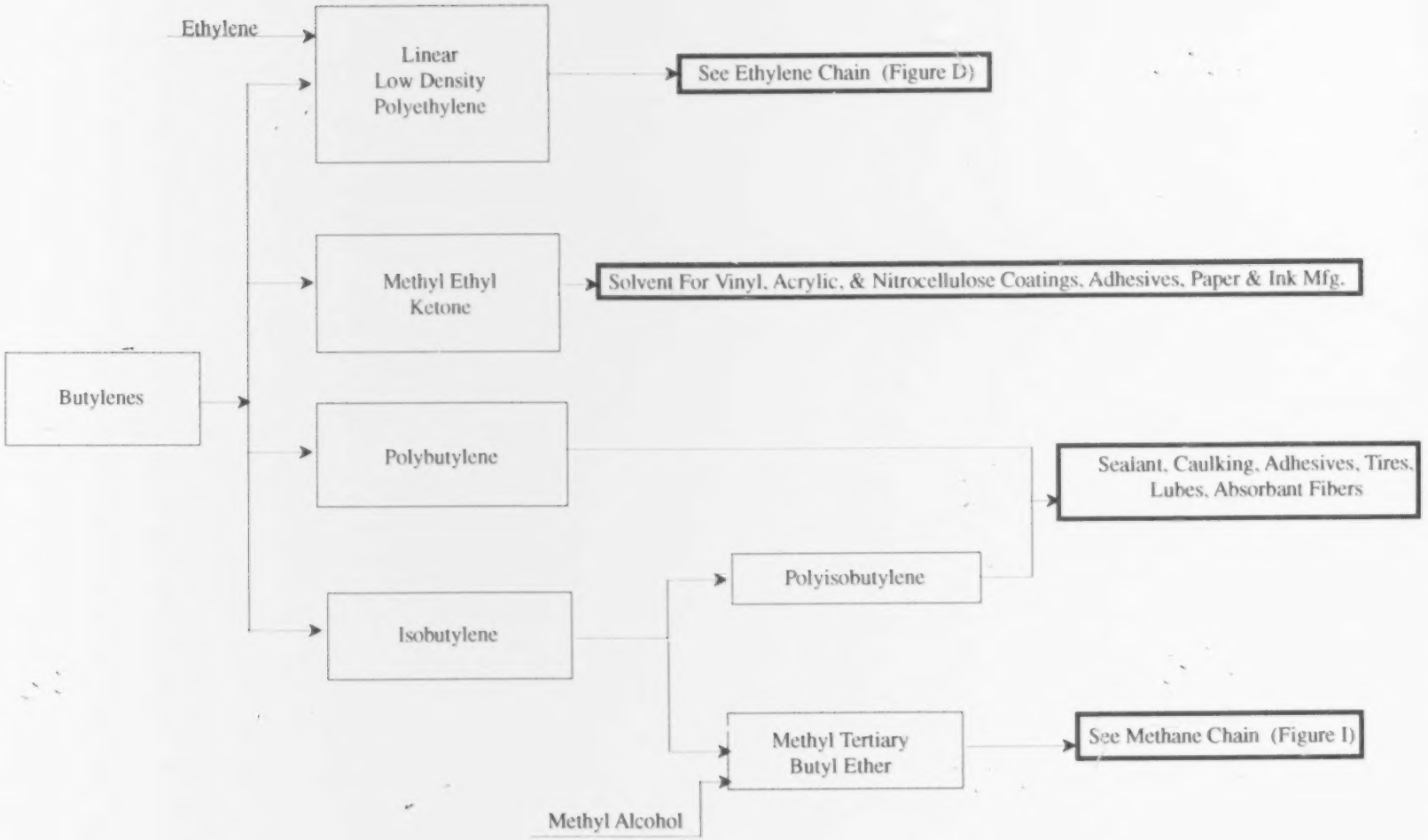
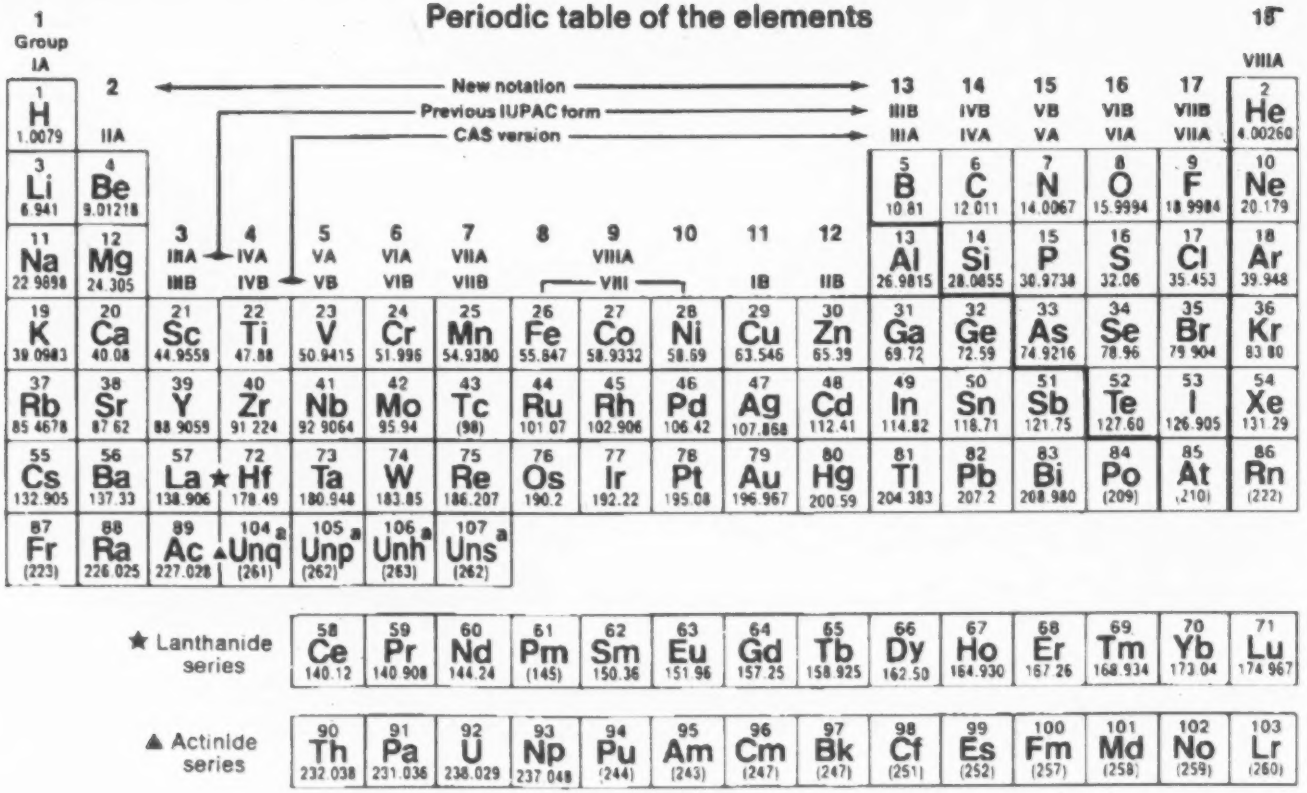


Figure K:

Foundations of Inorganic Chemistry



❑ The "Periodic Table" lists the 107 elements that are the basic building blocks of the earth. These elements can be considered the foundation of inorganic chemistry. Elements combine to form compounds such as salt (NaCl) which is a compound formed from sodium (Na) and chlorine (Cl).

❑ Salt (NaCl) can be used to make caustic soda (Figure L) and chlorine (Figure M). They are examples of inorganic chemicals -- those that do not contain carbon.

FIGURE L:

CAUSTIC SODA

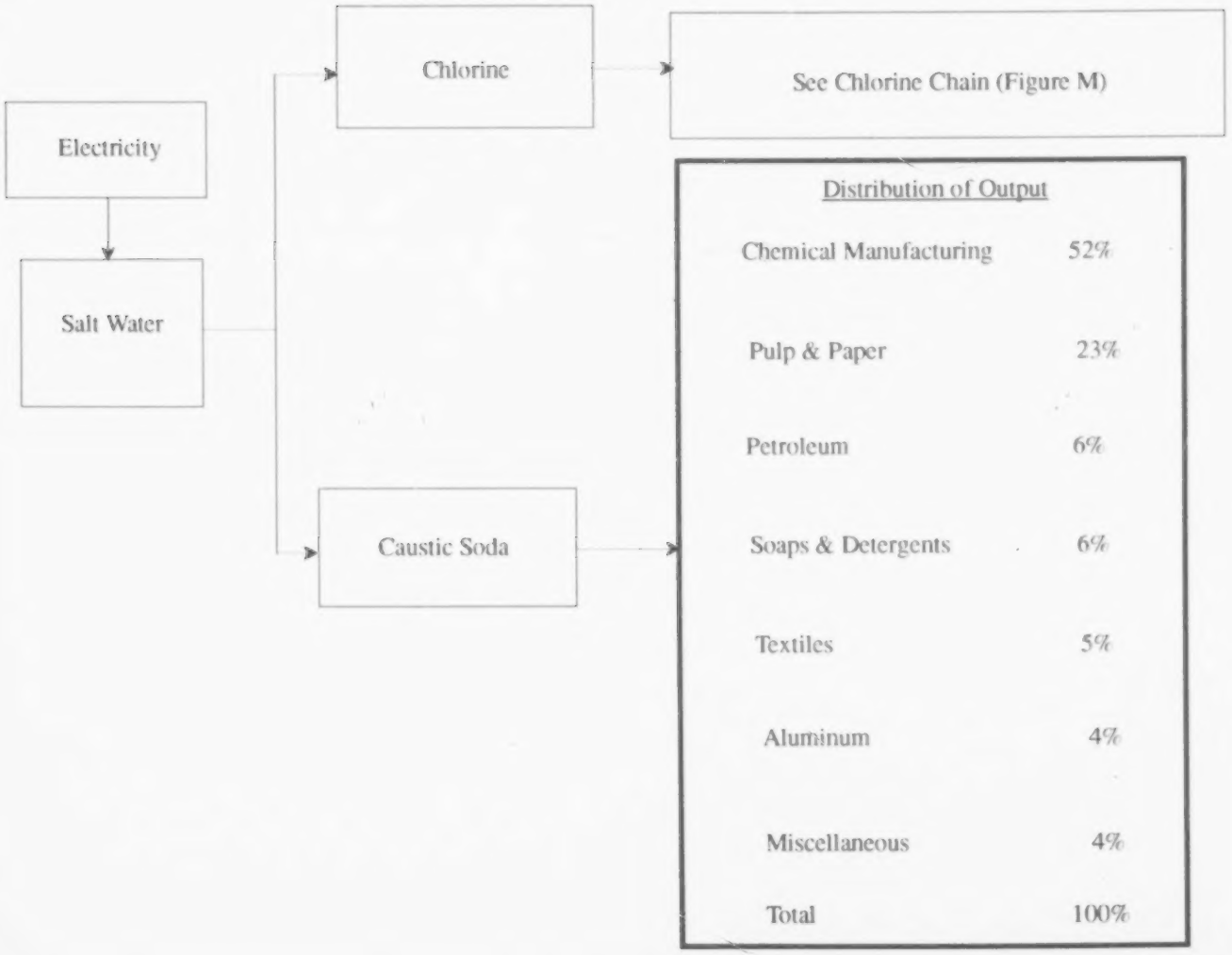
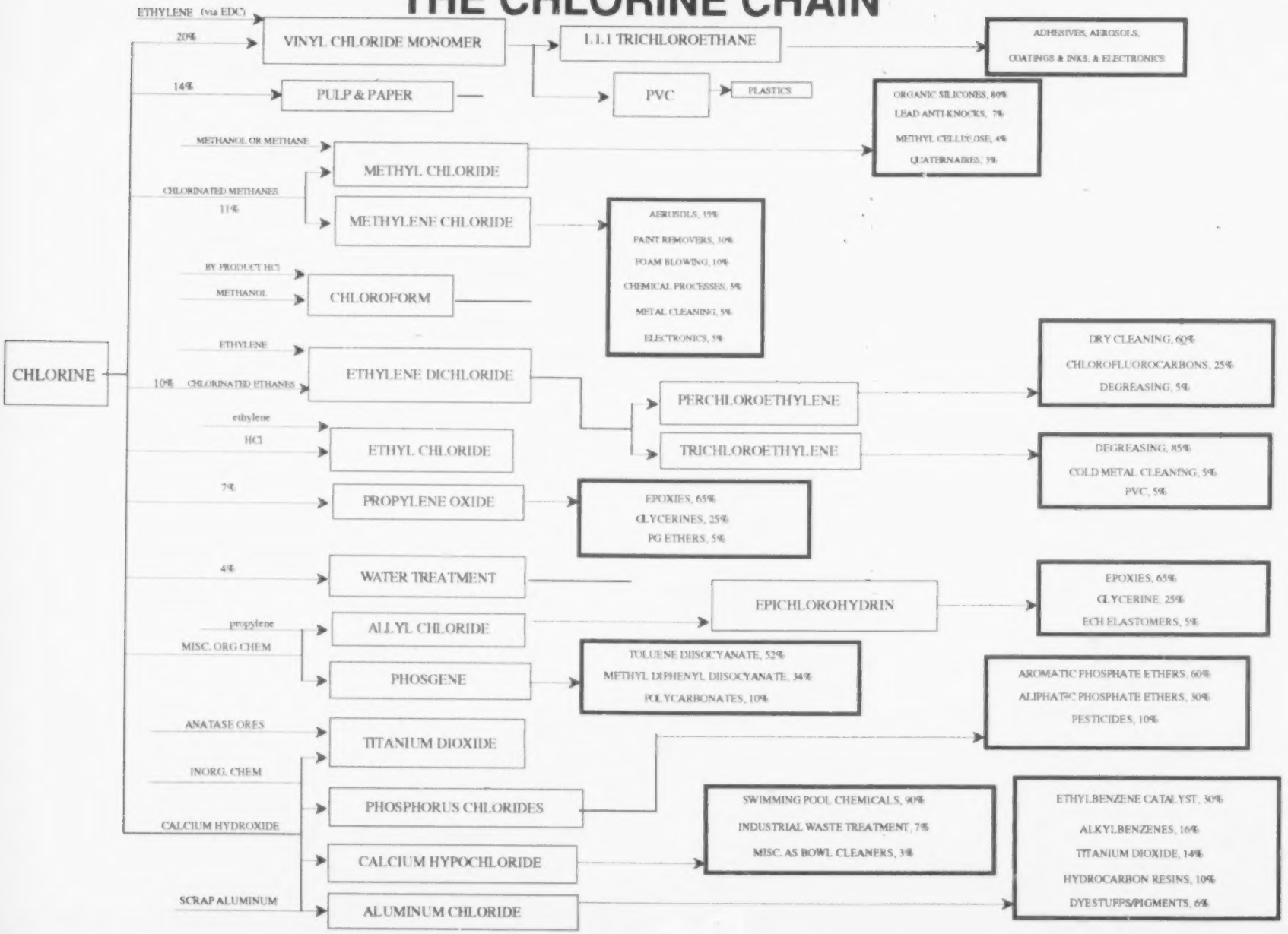


FIGURE M:
THE CHLORINE CHAIN



Section 1
Summary of Industry Performance

The U.S. chemical industry makes a wide variety of consumer goods as well as tens of thousands of products that are inputs to the production processes of the construction, manufacturing, service, and agriculture industries. Although one of the oldest U.S. industries, chemicals is a dynamic, high-technology, internationally competitive industry. It is the keystone of U.S. manufacturing, creating new products and processes essential to raising U.S. productivity and living standards.

Chemicals is a $1.2 trillion global industry that is characterized by large volumes of foreign direct investment and international trade. The U.S. chemical industry is the worlds largest, accounting for about 23 percent of the world total. Next ranking in total production are Japan, Germany and France. The U.S. chemical industry is the second largest (after Germany) exporter of chemicals, accounting for about 14 percent of total world exports of chemicals.

The U.S. chemical industry produces over 60,000 different products and in 1991 employed 1.1 million people, about 5.7 percent of the manufacturing total. Included are nearly 80,000 scientists, engineers, and technicians who are engaged in research and development (R&D).

About 55 percent of the industry's employees are production workers who earned average wages in 1991 that were 25 percent greater than those for manufacturing as a whole.

The chemical industry produces about 1.7 percent of total U.S. Gross National Product - roughly 8 percent of all U.S. manufacturing. It is the third largest manufacturing sector.

The chemical,industry is strong and growing. In 1991, shipments reached $288 billion, a record, and a 0.8 percent increase over 1990 levels.

The industry's trade surplus in 1991 was a record $18.8 billion, a 14 percent increase from 1990. Exports of $43.0 billion exceeded total U.S. agricultural exports, and were 10.2 percent above the previous year. Imports of $24.2 billion were 7.4 percent above 1990 imports.

Profits of $21 billion in 1991 were down from the 1989 peak but, nevertheless, provided the basis for new highs in R&D and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Investment in new plant and equipment reached $21.5 billion in 1991, a 4.0 percent increase over 1990. Of this, $2.3 billion was spent for pollution abatement and control. In 1991, the industry spent $13.3 billion on R&D, up over 5 percent from 1990.

The chemical industry's 1991 operating rate was 79.0 percent of capacity, down slightly from 81.4 percent in 1990.

TABLE 1.1
SUMMARY OF SELECTED INDICATORS - CHEMICALS & ALLIED PRODUCTS

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Shipments (billion $)	186.9	176.3	189.6	206.0	204.8	205.7	229.5	259.7	275.2	285.6	288.0	4.4%	7.0%	0.8%
Production Index (1987=100)	89.2	81.8	87.5	91.4	91.4	94.6	100.0	105.4	108.5	110.1	110.9	2.2%	3.2%	0.7%
Corporation Sales (billion $)	188.8	186.4	201.3	209.6	202.8	205.8	225.2	261.6	278.3	287.5	297.8	4.7%	7.7%	3.6%
Net Income - After Taxes (billion $)	13.0	10.3	11.6	13.9	9.5	12.9	16.6	23.7	24.5	23.4	21.0	4.9%	10.2%	-10.3%
Net Income to Sales (%)	6.9%	5.5%	5.8%	6.6%	4.7%	6.3%	7.4%	9.0%	8.8%	8.1%	7.1%	- -	- -	- -
Total Assets (billion $)	171.5	182.0	187.6	193.1	205.3	217.2	244.4	277.6	293.3	325.4	355.4	7.6%	10.3%	9.2%
Net Income to Assets (%)	7.6%	5.7%	6.2%	7.2%	4.6%	5.9%	6.8%	8.5%	8.4%	7.2%	5.9%	- -	- -	- -
New Plant & Equipment Expenditures (billion $)	12.0	11.4	11.6	13.5	14.4	14.5	13.9	16.6	18.5	20.6	21.5	6.0%	8.2%	4.4%
Operating Rate (%)	78.3%	71.0%	75.4%	78.0%	77.1%	78.9%	82.0%	83.9%	83.4%	81.4%	79.0%	- -	- -	- -
Producer Price Index (1982=100)	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.0	123.6	125.6	2.5%	4.1%	1.6%
Total Employment (thousands)	1109.0	1075.1	1042.8	1049.4	1044.1	1021.8	1025.9	1059.0	1076.1	1087.6	1072.4	-0.3%	1.0%	-1.4%
Average Weekly Wage - Production Workers ($)	379	408	440	464	485	502	523	537	555	577	601	4.7%	3.7%	4.2%
Funds for Research & Development (billion $)	5.6	6.6	7.2	7.9	8.5	8.8	9.6	10.8	11.5	12.6	13.3	9.0%	8.6%	5.6%
Exports (billion $)	21.2	19.9	20.0	22.8	21.8	22.5	26.0	31.9	37.4	39.0	43.0	7.3%	13.8%	10.3%
Imports (billion $)	9.5	9.5	11.0	13.9	14.7	15.3	15.6	20.3	20.7	22.5	24.2	9.8%	9.6%	7.6%
Trade Surplus (billion $)	11.7	10.4	9.0	8.9	7.1	7.2	9.5	11.6	16.6	16.5	18.8	4.9%	21.2%	13.9%

Source: U.S. Department of Commerce, U.S. Department of Labor, Federal Reserve Board, and National Science Foundation.

Section 2
Production, Prices, and Financial

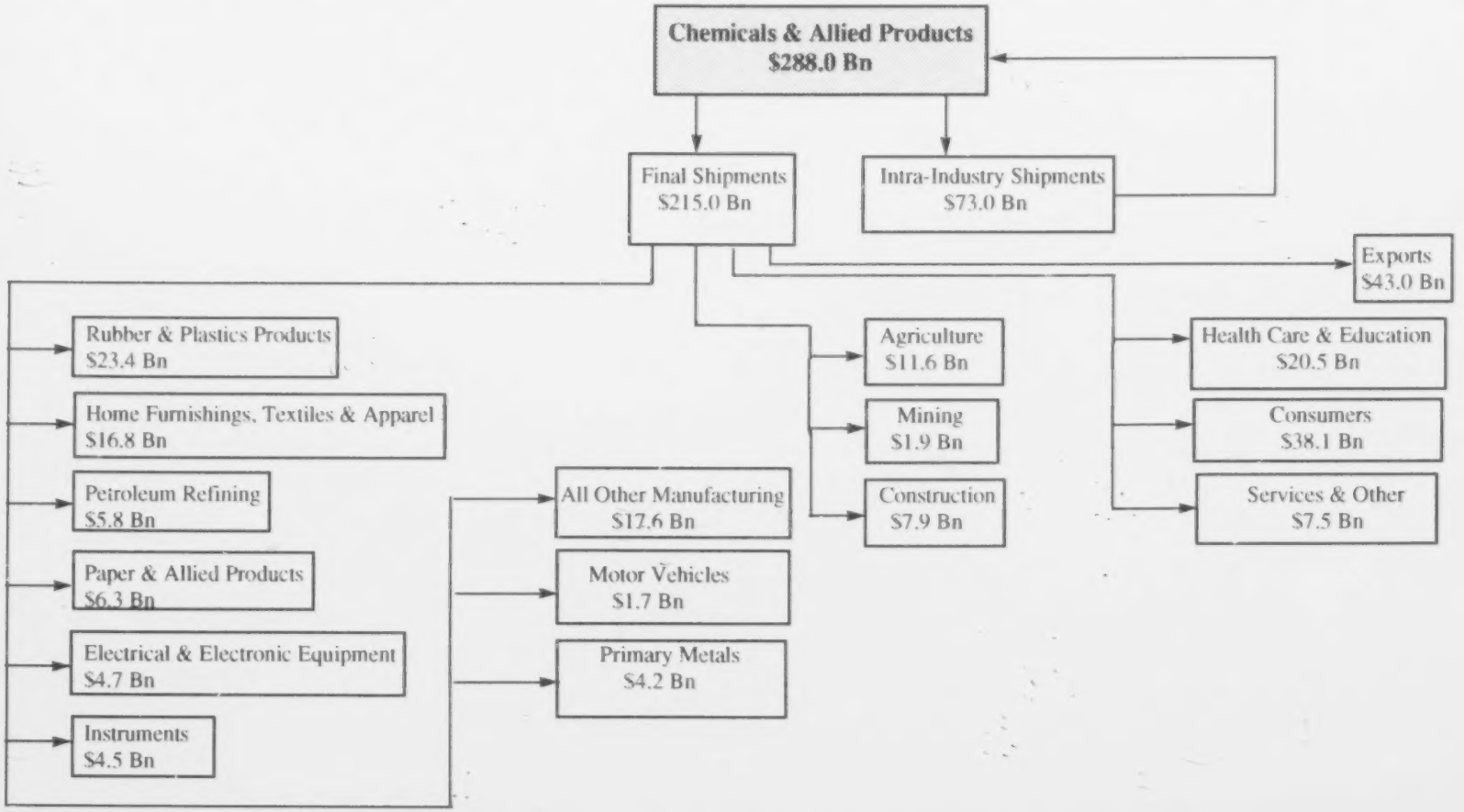
The $288 billion shipments of the U.S. chemical industry in 1991 include a wide variety of consumer goods as well as tens of thousands of products that are used extensively in the construction, manufacturing, service, and agricultural industries. Dating from 1635, the chemical industry is one of the oldest U.S. industries. However, it is also a dynamic, high-technology industry, investing billions of dollars annually in research and development (R&D). The U.S. chemical industry has remained internationally competitive, constantly creating new processes and producing more than 60,000 products that raise U.S. productivity and living standards.

The chemical industry is a key part of manufacturing and a key supplier to other manufacturing industries (Chart 2.1.) Value-added by the U.S. chemical industry in 1991 was equivalent to roughly 1.7 percent of Gross National Product and about 8 percent of all U.S. manufacturing (Chart 2.2). The chemical industry itself is the largest purchaser of its own production of chemicals, consuming 25 percent of the industry's output. The rest of manufacturing -- which includes a whole variety of industries engaged in mechanically or chemically transforming materials into new tangible goods -- purchases 29 percent of the U.S. chemical industry's output. Large purchasers of chemicals in manufacturing include rubber & plastic products, textiles, apparel, petroleum, paper & allied products, and primary metals. Large non-manufacturing end-uses for chemicals include agriculture, construction, health care, and consumers.

In 1991, the U.S. chemical industry's production volume increased 0.7 percent, a pace somewhat higher than that for the overall U.S. economy. Despite slightly lower operating rates, profits (the fourth best year ever) in 1991 of $21.0 billion provided the basis for new highs in R&D spending and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Composition of the industry has been changing, with increasing diversification into high-technology fields, such as pharmaceuticals, biotechnology, and advanced materials that have applications in transportation and other industries. The race to create new products and process technologies necessary to sustain a competitive edge in U.S. and world markets has increased the importance of R&D spending.

Chart 2.1
U.S. Chemical Industry Flow Chart, 1991



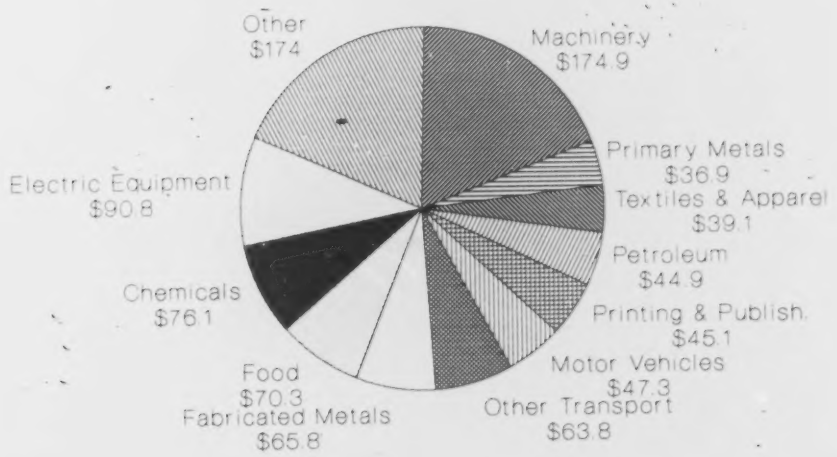
Above are estimates of the direct uses of the U.S. chemical industry's output. These estimates are based on the 1986 Input-Output (I-O) Tables of the U.S. economy with some adjustments. The estimates reflect direct purchases by the consuming industry or sector. In effect, the chart shows which industries or sectors are customers of the chemical industry. Indirect uses of chemicals incorporated into the outputs of other industries are not included. For example, these data do not reflect the motor vehicle sector's purchases of tires from the rubber & plastics products industry, which purchases synthetic rubber to make tires. The value of this synthetic rubber is not included in the $1.7 billion figure for motor vehicles. Thus, the total value of chemicals used in products produced by the automobile industry is actually several times larger than indicated above.

The U.S. manufacturing sector -- which accounts for about 23 percent of U.S. GNP (1982 dollars) -- includes several large industries such as non-electrical machinery, electric & electronic equipment, transportation equipment, and chemicals. Chemical industry value added of $76.1 billion in 1989 -- the most recent year for which this data are available -- was about 8 percent of the manufacturing section's total.

Chart 2.2

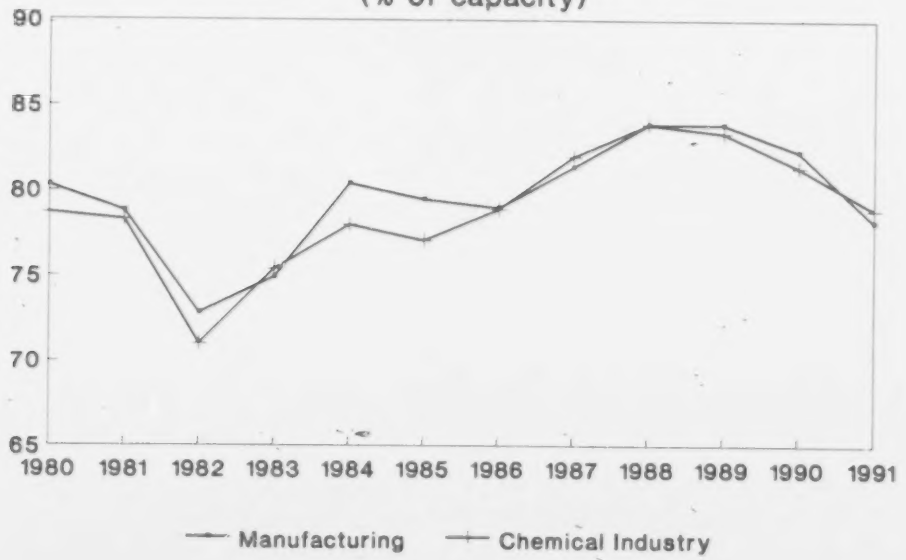
Value-Added By The Manufacturing Sector, 1989

($929 Billion 1982 Dollars)



Following the recession of the early-1980's, capacity utilization in the U.S. chemical industry steadily improved through 1988. Since 1986 chemical industry capacity utilization has closely paralelled that of manufacturing as a whole, declining from the 1988 peak.

Chart 2.3
Capacity Utilization
(% of capacity)



Source: Federal Reserve Board

Chemical Industry capacity utilization rose from 71 percent in 1982 to 83.9 percent in 1988. Since 1988, U.S. chemicals capacity has increased 11.7 percent. As a result of the recession and the rapid increase in U.S. and world capacity since 1988, U.S. capacity utilization has dropped by five percentage points, to 78.9 in 1991.

TABLE 2.1
INDUSTRIAL PRODUCTION INDICES (1987=100)

														Annual Growth Rates		
Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1991/81	1991/86	1991/90
Manufacturing	56.4	78.8	80.3	76.6	80.9	89.3	91.6	94.3	100.0	105.8	108.9	109.9	107.4	3.0%	2.6%	-2.3%
Chemicals & Allied Products	55.9	87.8	89.2	81.8	87.5	91.4	91.4	94.6	100.0	105.4	108.5	110.3	110.9	2.2%	3.2%	0.5%
Industrial Inorganic Chemicals	79.4	96.5	96.9	86.5	92.1	96.9	96.1	95.1	100.0	98.3	105.6	108.6	111.9	1.4%	3.3%	3.0%
Alkalies and Chlorine	n/a	101.5	94.6	82.1	87.9	95.3	93.6	92.1	100.0	96.0	103.2	99.5	96.3	0.2%	0.9%	-3.2%
Industrial Gases	n/a	91.5	91.2	80.1	85.9	97.5	92.8	98.8	100.0	104.1	108.0	109.2	111.9	2.1%	2.5%	2.5%
Inorganic Pigments	n/a	90.6	90.7	79.1	87.3	89.0	95.1	96.2	100.0	102.6	111.0	104.3	103.9	1.4%	1.6%	-0.4%
Industrial Inorganic Chemicals, nec	96.3	96.8	98.7	89.2	94.3	98.0	97.2	94.7	100.0	96.4	105.8	110.1	115.0	1.5%	4.0%	4.5%
Plastics Materials and Synthetics	39.5	71.2	79.5	71.8	84.3	88.9	86.9	91.6	100.0	104.4	103.1	106.5	108.5	3.2%	3.4%	1.9%
Plastic Materials and Resins	30.4	64.2	68.3	64.4	74.4	81.1	84.1	88.2	100.0	106.8	106.7	115.8	120.0	5.8%	6.4%	3.6%
Man-Made Fibers	47.5	74.9	91.7	76.4	92.3	93.3	86.6	93.7	100.0	99.5	98.7	92.7	92.0	0.0%	-0.4%	-0.8%
Drugs and Medicines	46.0	80.2	80.9	82.7	86.1	86.9	88.5	96.7	100.0	107.2	108.1	114.0	122.0	4.2%	4.8%	7.0%
Soap and Toiletries	68.1	103.5	97.7	89.2	91.4	90.6	91.3	96.7	100.0	107.8	111.1	112.3	107.7	1.0%	2.2%	-4.1%
Paints and Allied Products	81.3	87.0	84.1	78.8	84.6	91.8	95.7	97.5	100.0	103.9	104.8	99.4	90.9	0.8%	-1.4%	-8.6%
Industrial Organic Chemicals	n/a	92.8	97.0	81.0	89.9	93.4	94.1	95.1	100.0	103.1	109.2	107.1	102.6	0.6%	1.5%	-4.2%
Agricultural Chemicals	52.9	97.2	102.3	88.8	87.5	102.0	96.1	88.5	100.0	107.2	108.3	105.2	105.3	0.3%	3.5%	0.1%
Miscellaneous Chemical Products	46.0	80.2	80.9	82.7	86.1	86.9	88.5	96.7	100.0	107.2	108.1	114.0	122.0	4.2%	4.8%	7.0%

Source: Federal Reserve Board

TABLE 2.2
CAPACITY UTILIZATION (%)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Manufacturing	79.7	80.3	78.8	72.8	74.9	80.4	79.5	79.0	81.4	83.9	83.9	82.3	78.2
Chemicals & Allied Products	77.9	78.7	78.3	71.0	75.4	78.0	77.1	78.9	82.0	83.9	83.4	81.4	78.9
Plastic Materials	82.3	75.2	77.0	71.3	82.3	86.2	85.7	89.4	98.6	97.5	89.0	89.4	85.2
Synthetic Fibers	81.9	65.3	81.2	68.6	84.9	85.4	78.4	86.3	93.0	90.3	87.9	82.1	81.5

Source: Federal Reserve Board

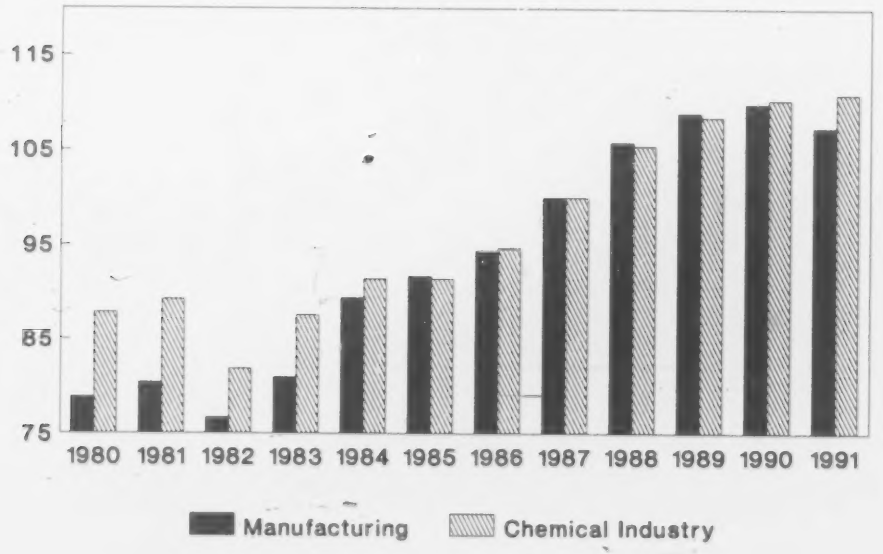
TABLE 2.3
GNP BY INDUSTRY (BILLION 1982 DOLLARS)

														Annual Growth Rates		
Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1991/81	1991/86	1991/90
Manufacturing	506.8	673.9	678.6	634.6	674.2	752.4	779.2	803.4	852.2	917.4	929.0	931.0	911.0	3.0%	2.5%	-2.1%
Chemicals & Allied Products	34.4	50.0	54.0	55.3	59.7	59.4	59.1	64.6	71.9	77.5	76.1	77.4	77.7	3.7%	3.8%	0.4%

Source: Bureau of Economic Analysis
1990 and 1991 data are CMA estimates based on BEA, Census, and FRB data

Following the recession of the early-1980's, chemical industry production expanded by 36 percent, closely paralleling that of manufacturing until 1991.

Chart 2.4
Industrial Production
(1987=100)



Source: Federal Reserve Board

The 36% chemicals production increase from 1982 to 1991 is an average annual growth rate of 3.4%. In 1991, chemical industry output growth slowed to 0.7% as a result of the recession. By comparison manufacturing output declined 2.2% in 1991.

TABLE 2.4
VALUE-ADDED BY MANUFACTURE (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Manufacturing	n/a	773831	837507	824118	881988	983228	1000142	1035437	1166555	1262412	1307961	1326362	n/a
Chemicals & Allied Products	n/a	74384	800032	77315	86473	94728	95257	100013	121239	137879	146056	153032	n/a
Industrial Inorganic Chemicals	n/a	8773	9274	8829	9205	10416	11085	10973	11232	12841	14534	16100	n/a
Plastic Materials and Synthetics	n/a	9760	10211	9402	12395	13678	12198	14152	17821	20755	21289	20511	n/a
Drugs	5131	13490	14880	16981	19368	20571	22716	24393	28161	31026	34358	38245	n/a
Soaps, Cleaners, and Toilet Goods	n/a	12737	13881	15282	15503	16484	17346	18627	21665	23602	23454	25008	n/a
Paints and Allied Products	n/a	3559	3867	3953	4706	4932	5169	5407	6221	6489	6453	6766	n/a
Industrial Organic Chemicals	5197	15696	16229	12341	14513	15991	14872	14716	21529	26985	29421	28813	n/a
Agricultural Chemicals	n/a	5699	6218	5097	5108	5911	5128	4708	6338	7605	7696	8060	n/a
Miscellaneous Chemical Products	n/a	4671	5474	5433	5675	6745	6744	7038	8273	8576	8851	9531	n/a

Source: Bureau of the Census
Data after 1986 are not comparable to prior years because of definitional differences.
Because these data include purchased services, they do not reflect a true value-added concept.

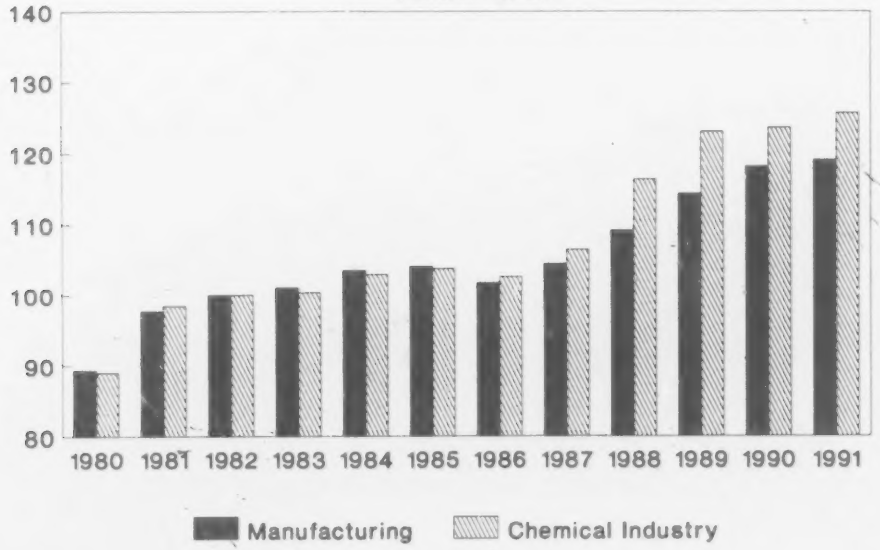
TABLE 2.5
INDUSTRY SHIPMENTS (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Manufacturing	633663	1852689	2017544	1960214	2070564	2288184	2334456	2335881	2475906	2682492	2840264	2917465	2863603
Chemicals & Allied Products	49195	168220	186909	176254	189552	205963	204790	205711	229546	259698	275187	285612	288018
By Segment:													
Industrial Chemicals, Except Pigments	26832	101705	112764	100082	109141	119437	114654	112182	126177	145483	150647	156282	151693
Drugs, Soap, and Toiletries	15073	41883	46913	50727	54562	57738	61291	66384	74011	81842	91741	97593	104698
Other Chemical Products	7290	24632	27232	25445	25849	28788	28845	27145	29358	32373	32799	31737	31627
By Use:													
Final Shipments	36744	122534	136199	131084	142965	155991	152584	152197	170231	192389	206259	212346	215045
Intra-Industry Shipments	12451	45686	50710	45170	46587	49972	52206	53514	59315	67309	68928	73266	72973
As a % of Total:													
Industrial Chemicals, Except Pigments	54.5%	60.5%	60.3%	56.8%	57.6%	58.0%	56.0%	54.5%	55.0%	56.0%	54.7%	54.7%	52.7%
Drugs, Soap, and Toiletries	30.6%	24.9%	25.1%	28.8%	28.8%	28.0%	29.9%	32.3%	32.2%	31.5%	33.3%	34.2%	36.4%
Other Chemical Products	14.8%	14.6%	14.6%	14.4%	13.6%	14.0%	14.1%	13.2%	12.8%	12.5%	11.9%	11.1%	11.0%
Final Shipments	74.7%	72.8%	72.9%	74.4%	75.4%	75.7%	74.5%	74.0%	74.2%	74.1%	75.0%	74.3%	74.7%
Intra-Industry Shipments	25.3%	27.2%	27.1%	25.6%	24.6%	24.3%	25.5%	26.0%	25.8%	25.9%	25.0%	25.7%	25.3%

Sources: Bureau of the Census, CMA analysis

Unlike the strong price growth during the inflationary 1970's, prices for chemicals increased significantly only after 1986, and increases then were stronger than for U.S. manufacturing as a whole.

Chart 2.5
Producer Prices
(1982=100)



Source: Bureau of Labor Statistics

Producer prices for chemicals rose an average of 6.3 percent per year from 1986 to 1989. In 1990 and 1991, the recession put downward pressure on chemical prices until Iraq invaded Kuwait and oil prices shot up. The 1991 index was 125.6 (1982=100). Much of the 1.6% increase in the price of chemicals in 1991 occurred in the first several months as a result of the increase in production costs.

TABLE 2.6
INVENTORIES (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	101246	261700	279453	307212	307675	334236	329555	317567	332619	361477	377201	382135	369493	2.8%	3.1%	-3.3%
Chemicals & Allied Products	6802	19899	22278	24278	24532	26238	25952	25558	26388	29372	30861	32118	32687	3.9%	5.0%	1.8%
By Industry Segment:																
Industrial Chemicals, Except Pigments	3514	10745	12118	13717	13833	14644	13995	13505	13737	15268	16331	16712	16515	3.1%	4.1%	-1.2%
Drugs, Soap, and Toiletries	2017	5901	6397	6724	6929	7574	7826	8250	8860	9898	10136	10641	11292	5.8%	6.5%	6.1%
Other Chemical Products	1271	3253	3763	3837	3770	4020	4131	3803	3791	4206	4394	4765	4880	2.6%	5.1%	2.4%
By Type:																
Materials and Supplies	2373	8031	8376	8552	8881	8930	8828	8971	9338	10305	10616	10903	10975	2.7%	4.1%	0.7%
Work in Progress	977	3278	3423	4126	4001	4223	4086	3864	3980	4322	4835	4994	5309	4.5%	6.6%	6.3%
Finished Goods	3452	8590	10479	11600	11650	13085	13038	12723	13070	14745	15410	16221	16403	4.6%	5.2%	1.1%

Source: Bureau of the Census

- At the end of 1991, chemical inventories were only 1.39 times average monthly sales. At the same point after the 1981-82 recession, inventories were about 1.50 times sales. At the end of 1991, manufacturing industries inventories were 1.59 times average monthly sales.

TABLE 2.7
PRODUCER PRICE INDICES (1982=100)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	37.7	89.3	97.7	100.0	101.0	103.5	104.0	101.7	104.4	109.1	114.3	118.1	119.0	2.0%	3.2%	0.8%
Chemicals & Allied Products	35.0	89.0	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.0	123.6	125.6	2.5%	4.1%	1.6%
Industrial Chemicals	28.6	91.9	103.1	100.0	97.3	96.8	96.0	91.5	95.5	106.8	114.8	113.2	111.8	0.8%	4.1%	-1.2%
Inorganic Chemicals	n/a	77.6	93.1	100.0	95.1	94.3	96.7	95.2	94.5	100.9	108.9	111.7	112.5	1.9%	3.4%	0.7%
Organic Chemicals	n/a	98.7	107.5	100.0	98.2	97.8	95.4	89.3	95.0	108.2	116.2	112.9	110.6	0.3%	4.4%	-2.0%
Plastic Resins and Materials	32.0	98.5	102.0	100.0	102.4	108.9	107.5	104.4	110.3	132.4	133.4	124.1	120.0	1.6%	2.8%	-3.3%
Drugs and Pharmaceuticals	48.1	83.1	92.1	100.0	107.7	114.2	122.2	129.9	139.1	148.4	160.0	170.8	182.6	7.1%	7.0%	6.9%
Agricultural Chemicals	30.3	87.9	97.5	100.0	96.0	97.4	96.2	94.2	96.4	104.5	108.7	107.4	111.7	1.4%	3.5%	4.0%
Other Chemicals & Allied Products	40.2	83.1	94.1	100.0	101.3	102.7	105.2	105.8	107.0	111.9	117.3	118.9	121.4	2.6%	2.8%	2.1%

Source: Bureau of Labor Statistics

TABLE 2.8
CORPORATE PROFITS WITH INVENTORY VALUATION ADJUSTMENT (BILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	27.1	75.8	87.4	63.1	71.4	86.8	80.1	59.0	87.1	117.5	113.6	95.7	81.7	-0.7%	6.7%	-14.6%
Chemicals & Allied Products	3.9	5.5	7.6	4.7	6.8	7.3	6.0	8.0	15.1	19.3	19.9	20.3	20.2	10.3%	20.4%	-0.5%

Source: Bureau of Economic Analysis

TABLE 2.9
CHEMICAL INDUSTRY REVENUES AND INCOME (MILLION DOLLARS)

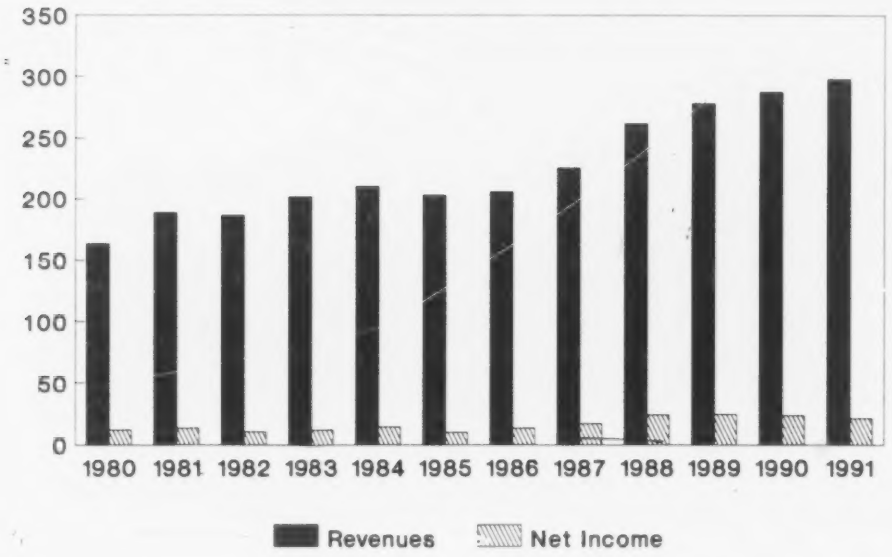
Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Revenues	n/a	163153	188821	186375	201319	209627	202804	205778	225200	261616	278300	287457	297772	4.7%	7.7%	3.6%
Depreciation and Amortization	n/a	5959	7058	7943	8586	8936	9195	10024	9911	11027	12104	12939	13722	6.9%	6.5%	6.1%
Other Operating Costs and Expenses	n/a	143186	165546	166509	178269	183729	180411	180251	195992	225361	240436	248910	258379	4.6%	7.5%	3.8%
Income (or Loss) from Operations	n/a	14008	16215	11924	14465	16960	13199	15503	19297	25229	25759	25606	25671	4.7%	10.6%	0.3%
Nonoperating Income	n/a	3070	2722	2150	2236	2860	394	4556	6271	8321	8130	7245	2947	0.8%	-8.3%	-59.3%
Income Before Income Taxes	n/a	17078	18937	14074	16702	19820	13592	20059	25566	33551	33889	32851	28618	4.2%	7.4%	-12.9%
Income Taxes	n/a	5316	5964	3750	5059	5937	4051	7158	9007	9899	9367	9433	7614	2.5%	1.2%	-19.3%
Income After Taxes	n/a	11762	12973	10324	11643	13883	9541	12901	16559	23661	24523	23418	21004	4.9%	10.2%	-10.3%
Taxes as a % of Pre-Tax Income	n/a	31.1%	31.5%	26.6%	30.3%	30.0%	29.8%	35.7%	35.2%	29.5%	27.6%	28.7%	26.6%			

Source: Bureau of the Census

- o According to the Bureau of Census, the chemical industry paid $7.6 billion in income taxes in 1991, more than any other manufacturing industry, including petroleum and transportation equipment. Taxes took nearly 27% of the chemical industry's pre-tax income in 1991.

Chemical industry net after tax income increased steadily after 1985 to a 1989 peak level of $24.5 billion, about 9 percent of revenue that year.

Chart 2.6
Revenues and Income



Chemical industry income after taxes rose by an average of 27 percent per year from 1985 to 1989. Since then, increased operating costs, low capacity utilization and weak pricing have caused net income to fall. Nonetheless, at $21 billion 1991 net income was the fourth best year on record. Profits in 1991, however, were only 7.1 percent of total revenue.

TABLE 2.10
CHEMICAL INDUSTRY ASSETS (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Cash and Securities	n/a	5359	6880	7027	8187	9133	9840	11033	11452	12887	12408	11213	13868	7.3%	4.7%	23.7%
Receivables	n/a	24114	25482	25135	27407	26886	28404	27651	32898	37614	39103	41260	41707	5.1%	8.6%	1.1%
Inventories	n/a	24149	28180	27098	26967	28261	28607	28081	31265	34731	35688	37505	38247	3.1%	6.4%	2.0%
Other Current Assets	n/a	4216	4580	5858	5712	6571	7190	8916	10306	11717	12209	14177	14355	12.1%	10.0%	1.3%
Total Current Assets	n/a	57838	65122	65118	68273	70851	74041	75681	85921	96949	99408	104155	108177	5.2%	7.4%	3.9%
Depreciable and Amortizable Fixed Assets	n/a	99888	109632	122051	128255	133358	137197	138686	149417	160452	175430	191641	219507	7.2%	9.6%	14.5%
Land and Mineral Rights	n/a	4716	5854	7930	7873	6783	6350	6211	6295	9044	7443	12623	12996	8.3%	15.9%	3.0%
Accumulated Depreciation and Amortization	n/a	45816	47963	53169	57851	62860	66381	67350	72946	76660	82654	89678	101253	7.8%	8.5%	12.9%
Net Property, Plant & Equipment	n/a	58788	67523	76813	78277	77281	77166	77547	82766	92835	100219	114586	131251	6.9%	11.1%	14.5%
Other Non-Current Assets	n/a	32270	38866	40073	41022	44957	54132	63938	75759	87798	93690	106629	116010	11.6%	12.7%	8.8%
Total Assets	n/a	148896	171511	182004	187572	193089	205339	217166	244446	277582	293317	325370	355438	7.6%	10.4%	9.2%

Source: Bureau of the Census

TABLE 2.11
CHEMICAL INDUSTRY LIABILITIES AND SHAREHOLDERS' EQUITY (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Current Liabilities	n/a	31671	34270	36421	40896	44759	50229	50898	60422	67563	73620	77906	81579	9.1%	9.9%	4.7%
Long-Term Debt & Other Liabilities	n/a	37684	47387	50289	49494	48010	54787	65468	77142	89490	91903	109247	124501	10.1%	13.7%	14.0%
Total Liabilities	n/a	69355	81657	86710	90390	92769	105016	116366	137564	157053	165523	187512	206079	9.7%	12.1%	9.9%
Shareholders' Equity	n/a	79541	89855	95294	97182	100321	100323	100801	106882	120530	127794	138218	149358	5.2%	8.2%	8.1%
Total Liabilities and Shareholder's Equity	n/a	148896	171511	182004	187572	193089	205339	217166	244446	277582	293317	325370	355438	7.6%	10.4%	9.2%

Source: Bureau of the Census

- Growth in shareholder equity from 1981 to 1991 was 5.2 percent per year, well below the 7.6 percent growth in assets and the 9.7 percent growth in liabilities.

TABLE 2.12
CHEMICAL INDUSTRY FINANCIAL RATIOS

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Profitability:													
Operating Margin	n/a	8.6%	8.6%	6.4%	7.2%	8.1%	6.5%	7.5%	8.6%	9.6%	9.3%	8.9%	8.6%
Return on Sales	n/a	7.2%	6.9%	5.5%	5.8%	6.6%	4.7%	6.3%	7.4%	9.0%	8.8%	8.1%	7.1%
Return on Assets	n/a	7.9%	7.6%	5.7%	6.2%	7.2%	4.6%	5.9%	6.8%	8.5%	8.4%	7.2%	59.0%
Return on Equity	n/a	14.8%	14.4%	10.8%	12.0%	13.8%	9.5%	12.8%	15.5%	19.6%	19.2%	16.9%	14.1%
Solvency and Liquidity:													
Debt/Equity Ratio	n/a	0.87	0.91	0.91	0.93	0.92	1.05	1.15	1.29	1.30	1.30	1.36	1.38
Current Ratio	n/a	1.83	1.90	1.79	1.67	1.58	1.47	1.49	1.42	1.43	1.35	1.34	1.33
Quick Ratio	n/a	1.06	1.08	1.04	1.01	0.95	0.90	0.94	0.90	0.92	0.87	0.86	0.86
Debt Ratio	n/a	0.47	0.48	0.48	0.48	0.48	0.51	0.54	0.56	0.57	0.56	0.58	0.58
Inventory Turnover	n/a	6.76	6.70	6.88	7.47	7.42	7.09	7.33	7.20	7.53	7.80	7.66	7.79
Working Capital Turnover	n/a	2.82	2.90	2.86	2.95	2.96	2.74	2.72	2.62	2.70	2.80	2.76	2.75
Fixed Asset Turnover	n/a	2.78	2.80	2.43	2.57	2.71	2.63	2.65	2.72	2.82	2.78	2.51	2.27
Total Asset Turnover	n/a	1.10	1.10	1.02	1.07	1.09	0.99	0.95	0.92	0.94	0.95	0.88	0.84

Source: Bureau of the Census, CMA analysis

TABLE 2.13
INORGANIC CHEMICALS PRODUCTION (THOUSAND TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Aluminum Sulfate	1191	1286	1294	1154	1120	1239	1204	1213	1226	1237	1243	1227	1180	-0.9%	-0.6%	-3.8%
Calcium Chloride	704	811	917	875	857	1088	584	419	462	509	471	518	485	-6.2%	3.0%	-6.4%
Caustic Soda (Sodium Hydroxide)	10141	11606	10621	9385	10039	10914	10790	10405	11553	10533	11469	12030	12195	1.4%	3.2%	1.4%
Chlorine	9764	11421	10763	9176	9864	10700	10402	10442	11078	11257	11413	11810	11325	0.5%	1.6%	-4.1%
Hydrochloric Acid	2014	2888	2574	2450	2468	2693	2803	2392	2996	3228	3268	3013	2800	0.8%	3.2%	-7.1%
Hydrogen Peroxide	61	116	111	108	117	139	144	152	153	168	204	238	265	9.1%	11.8%	11.3%
Phosphorous, Elemental	597	432	426	361	366	386	359	364	344	343	353	346	310	-3.1%	-3.2%	-10.4%
Soda Ash (Sodium Carbonate)	7071	8275	8281	7819	8467	8511	8511	8436	8891	9632	9915	9156	9930	1.8%	3.3%	8.5%
Sodium Silicate, Anhydrous	628	786	771	664	710	685	692	791	952	812	873	879	895	1.5%	2.5%	1.8%
Sodium Sulfate	1373	1139	1111	864	914	901	811	841	799	819	755	786	770	-3.6%	-1.7%	-2.0%
Sodium Tripolyphosphate	1208	789	696	651	669	692	612	617	586	549	580	532	570	-2.0%	-1.6%	7.1%
Sulfuric Acid	29525	44157	40742	33233	37459	41893	39890	35993	39256	42580	43301	44044	43310	0.6%	3.8%	-1.7%
Titanium Dioxide	655	727	761	660	760	835	864	924	968	1022	1101	1077	1095	3.7%	3.5%	1.7%

Source: Bureau of the Census

TABLE 2.14
ORGANIC CHEMICALS PRODUCTION (MILLION POUNDS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Acetic Acid	1932	2977	2705	2748	2807	2619	2897	2728	3246	3159	3294	3751	3610	2.9%	5.8%	-3.8%
Acetone	1615	2076	2144	1693	1859	1862	1788	1910	1845	2303	2524	2330	2130	-0.1%	2.2%	-8.6%
Acrylonitrile	1039	1830	1996	2035	2146	2219	2349	2182	2452	2609	2362	2676	2645	2.9%	3.9%	-1.2%
Adipic Acid	1081	1350	1345	1310	1385	1480	1525	1575	1605	1630	1635	1615	1550	1.4%	-0.3%	-4.0%
Aniline	398	659	634	557	663	786	716	824	859	1029	1016	989	995	4.6%	3.8%	0.6%
Benzene	7675	11227	9573	7700	8435	8530	8251	8860	10589	11627	11936	12443	13355	3.4%	8.6%	7.3%
Bisphenol A	202	530	555	480	643	762	949	956	1000	1340	1242	1150	1180	7.8%	4.3%	2.6%
Butadiene (1,3-)	3101	2799	2986	1915	2353	2827	2340	2546	2931	3169	3121	3088	2910	-0.3%	2.7%	-5.8%
Caprolactum	500	910	928	793	976	1027	1089	1109	1156	1261	1307	1379	1285	3.3%	3.0%	-6.8%
Chloroform	240	353	405	299	362	405	275	422	462	524	588	484	440	0.8%	0.8%	-9.1%
Cumene	1993	3459	3309	2743	3345	3754	2627	3745	4105	4455	4426	4311	4285	2.6%	2.7%	-0.6%
Cyclohexane	1841	1964	1820	1275	1656	1994	1657	2070	2276	2297	2273	2461	2310	2.4%	2.2%	-6.1%
Diethylene Glycol	341	382	364	394	463	535	441	490	436	563	435	482	490	3.0%	0.0%	1.7%
Ethanolamines	264	376	429	416	468	504	537	543	627	608	667	727	645	4.2%	3.5%	-11.3%
Ethyl Acetate	161	234	277	235	213	210	192	199	214	254	292	272	275	-0.1%	6.7%	1.1%
Ethylbenzene	4827	7642	7813	6656	7876	7562	7386	9020	9346	9929	9236	8369	9220	1.7%	0.4%	10.2%
Ethylene	18089	28667	29418	24501	28680	31383	29847	32859	34951	37204	34988	36467	39225	2.9%	3.6%	7.6%
Ethylene Dichloride	7460	11108	9974	7619	11506	10710	12101	12940	12197	13028	13383	13850	13920	3.4%	1.5%	0.5%
Ethylene Glycol	3038	4386	4143	4309	4425	3224	4178	4770	5183	5517	5461	5071	4930	1.8%	0.7%	-2.8%
Ethylene Oxide	3865	5220	4937	4987	5534	5699	5430	5430	4785	5953	5031	5355	5245	0.6%	-0.7%	-2.1%
Formaldehyde	4427	5555	5721	4817	5465	5815	5606	5549	5733	6280	5893	6720	6425	1.2%	3.0%	-4.4%
Isopropyl Alcohol	1919	1836	1669	1380	1209	1394	1235	1301	1371	1389	1474	1456	1295	-2.5%	-0.1%	-11.1%
Maleic Anhydride	215	304	293	260	299	359	394	359	382	448	475	424	385	2.8%	1.4%	-9.2%
Methanol	4932	7153	8577	7556	7982	8186	5003	7205	7537	7345	8167	8344	8655	0.1%	3.7%	3.7%
Methyl-Tertiary-Butyl Ether (MTBE)	120	430	600	690	840	1375	1890	2235	3514	5680	8227	8884	9290	31.5%	33.0%	4.6%
Methyl Chloride	423	362	405	366	409	482	415	605	373	428	461	498	490	1.9%	-4.1%	-1.6%
Methyl Chloroform	366	692	614	595	586	675	869	652	694	724	783	803	650	0.6%	-0.1%	-19.1%
Methyl Ethyl Ketone	480	587	611	468	531	543	537	600	672	482	450	465	515	-1.7%	-3.0%	10.8%
Methyl Methacrylate	445	780	891	721	844	917	858	943	1029	1100	1161	1182	1100	2.1%	3.1%	-6.9%
Methylene Chloride	402	561	592	532	584	607	467	566	516	504	482	461	390	-4.1%	-7.2%	-15.4%
Perchloroethylene	707	765	691	585	547	573	678	414	473	498	481	372	240	-10.0%	-10.3%	-35.5%
Phenol	1708	2568	2578	2175	2638	2889	2841	3115	3841	3562	3806	3538	3485	3.1%	2.3%	-1.5%
Phthalic Anhydride	734	818	870	684	838	870	820	864	1035	999	917	940	875	0.1%	0.3%	-6.9%
Propylene	6641	13675	13482	12535	13959	15559	14887	16522	19019	21224	20572	21846	22020	5.0%	5.9%	0.8%
Propylene Glycol	428	488	473	400	484	462	500	573	747	840	805	754	745	4.6%	5.4%	-1.2%
Propylene Oxide	1179	1767	1730	1470	1570	1785	2375	2450	2570	3000	3030	2965	2905	5.3%	3.5%	-2.0%
Styrene	4335	6856	6679	5942	6802	7709	7622	7888	8014	8984	8337	8017	9005	3.0%	2.7%	12.3%
Terephthalic Acid, Dimethyl Ester	1447	6054	6235	4843	5626	5912	6490	6257	7601	10234	8426	7773	7655	2.1%	4.1%	-1.5%
Toluene	4612	5624	4599	4162	4393	4463	4008	4408	6206	6299	5809	6210	7825	5.5%	12.2%	26.0%
Vinyl Acetate	803	1921	1936	1876	1963	2024	2112	1710	1813	2561	2553	2659	2645	3.2%	9.1%	-0.5%
Vinyl Chloride	4040	6466	6874	4902	6875	6085	9463	8439	8402	9058	10135	10624	11695	5.5%	6.7%	10.1%
o-Xylene	799	995	918	802	781	688	675	788	940	971	983	943	935	0.2%	3.5%	-0.8%
p-Xylene	1590	4238	4532	3391	4114	4264	4779	5035	5155	5601	5345	5200	5430	1.8%	1.5%	4.4%

Source: United States International Trade Commission, CMA estimates

TABLE 2.15
PLASTIC RESINS PRODUCTION (MILLION POUNDS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Phenolic Resins	1186	1745	1688	1398	1460	1656	1714	1520	1697	1687	1838	2081	1875	1.1%	4.3%	-9.9%
Polyamide Resins	108	315	339	264	348	386	409	477	634	656	714	636	810	9.1%	11.2%	27.4%
Polyethylene and Copolymers	5844	11720	12604	12548	13890	14621	15318	16218	17378	18694	16135	19381	18195	3.7%	2.3%	-6.1%
Polypropylene	1031	3699	4008	3515	4457	5216	5654	5835	6978	7258	6701	7640	7480	6.4%	5.1%	-2.1%
Polystyrene and Copolymers	3550	5540	5915	5609	6254	6857	7229	5794	8283	9185	7918	7557	7110	1.9%	4.2%	-5.9%
Polyvinyl Chloride and Copolymers	3756	5485	5618	5397	6256	6828	6668	7499	8339	8588	8824	9363	8770	4.6%	3.2%	-6.3%

Source: United States International Trade Commission

TABLE 2.16
INDUSTRIAL GASES PRODUCTION (MILLION CUBIC FEET)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Acetylene	14834	5493	5172	3824	3901	4974	4972	4971	5284	5297	5445	5207	4567	-1.2%	-1.7%	-12.3%
Hydrogen	59654	106562	104817	88131	103354	112790	121243	136478	149217	177008	145544	147840	141844	3.1%	0.8%	-4.1%
Nitrogen	151191	479240	489666	482726	560124	651654	603707	677474	675843	722013	744068	749525	786727	4.9%	3.0%	5.0%
Oxygen	329729	430977	430616	348814	345881	386615	356511	383267	402644	451999	451802	462293	471216	0.9%	4.2%	1.9%

Source: Bureau of the Census

TABLE 2.17
INORGANIC FERTILIZER PRODUCTION (THOUSAND TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Ammonia, Synthetic Anhydrous	13824	19653	19045	15081	13952	16702	17319	14488	16098	16821	16468	16796	17020	-1.1%	3.3%	1.3%
Ammonium Nitrate	6456	9127	8861	7091	6240	7165	7149	6091	6547	7504	7871	7081	7310	-1.9%	3.7%	3.2%
Ammonium Sulfate	1894	2136	2185	1769	1956	2067	2093	2080	2189	2333	2384	2539	2230	0.2%	1.4%	-12.2%
Nitric Acid	7603	9232	9093	7390	6968	7798	7645	6736	7225	7991	8349	7999	7525	-1.9%	2.2%	-5.9%
Nitrogen Solutions	1721	2773	3099	2786	2605	2894	2656	2275	2385	2902	2913	2853	3135	0.1%	6.6%	9.9%
Phosphoric Acid	5683	10848	9958	8253	9767	11394	10607	9578	10599	11659	11737	12034	12340	2.2%	5.2%	2.5%
Urea	3119	7830	8062	6470	6137	7752	6974	6264	7433	7914	8004	8120	8070	0.0%	5.2%	-0.6%

Source: Bureau of the Census

TABLE 2.18
TOP 50 CHEMICALS PRODUCTION BY VOLUME (THOUSAND TONS)

Rank	Item	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
1	Sulfuric Acid	29525	44157	40742	33233	37459	41893	39890	35993	39256	42580	43301	44044	43310	0.6%	3.8%	-1.7%
2	Nitrogen	5478	17364	17742	17490	20295	23611	21874	24547	24487	26160	26959	27157	28505	4.9%	3.0%	5.0%
3	Ethylene	9045	14334	14709	12251	14340	15692	14924	16430	17476	18602	17494	18234	19613	2.9%	3.6%	7.6%
4	Oxygen	13647	17838	17823	14437	14316	16002	14756	15863	16665	18708	18700	19134	19504	0.9%	4.2%	1.9%
5	Ammonia, Synthetic Anhydrous	13824	19653	19045	15081	13952	16702	17319	14488	16098	16821	16468	16796	17020	-1.1%	3.3%	1.3%
6	Phosphoric Acid	5683	10848	9958	8253	9767	11394	10607	9578	10599	11659	11737	12034	12340	2.2%	5.2%	2.5%
7	Caustic Soda (Sodium Hydroxide)	10141	11606	10621	9385	10039	10914	10790	10405	11553	10533	11469	12030	12195	1.4%	3.2%	1.4%
8	Chlorine	9764	11421	10763	9176	9864	10700	10402	10442	11078	11257	11413	11810	11325	0.5%	1.6%	-4.1%
9	Propylene	3321	6838	6741	6268	6980	7780	7444	8261	9510	10612	10286	10923	11010	5.0%	5.9%	0.8%
10	Soda Ash (Sodium Carbonate)	7071	8275	8281	7819	8467	8511	8511	8438	8891	9632	9915	9156	9930	1.8%	3.3%	8.5%
11	Urea	3119	7830	8062	6470	6137	7752	6974	6264	7433	7914	8004	8120	8070	0.0%	5.2%	-0.6%
12	Nitric Acid	7603	9232	9093	7390	6968	7798	7645	6736	7225	7991	8349	7999	7525	-1.9%	2.2%	-5.9%
13	Ammonium Nitrate	6456	9127	8861	7091	6240	7165	7149	6091	6547	7504	7871	7081	7310	-1.9%	3.7%	3.2%
14	Ethylene Dichloride	3730	5554	4987	3810	5753	5355	6051	6470	6099	6514	6692	6925	6960	3.4%	1.5%	0.5%
15	Benzene	3838	5614	4787	3850	4218	4265	4126	4430	5295	5814	5968	6222	6678	3.4%	8.6%	7.3%
16	Vinyl Chloride	2020	3233	3437	2451	3438	3043	4732	4220	4201	4529	5068	5312	5848	5.5%	6.7%	10.1%
17	Carbon Dioxide	1135	3720	3982	3682	3880	4315	4623	4775	4731	5058	5339	5186	4880	2.1%	0.4%	-5.9%
18	Methyl-Tertiary-Butyl Ether (MTBE)	60	215	300	345	420	688	945	1118	1757	2840	4114	4442	4645	31.5%	33.0%	4.6%
19	Ethylbenzene	2414	3821	3907	3328	3938	3781	3693	4510	4673	4965	4618	4185	4610	1.7%	0.4%	10.2%
20	Styrene	2168	3428	3340	2971	3401	3855	3811	3944	4007	4492	4169	4009	4503	3.0%	2.7%	12.3%
21	Methanol	2466	3577	4289	3778	3991	4093	2502	3603	3769	3673	4084	4172	4328	0.1%	3.7%	3.7%
22	Toulene	2306	2812	2300	2081	2197	2232	2004	2204	3103	3150	2905	3105	3913	5.5%	12.2%	26.0%
23	Terephthalic Acid	724	3027	3118	2422	2813	2956	3245	3129	3801	5117	4213	3887	3828	2.1%	4.1%	-1.5%
24	Formaldehyde	2214	2778	2861	2409	2733	2908	2803	2775	2867	3140	2947	3360	3213	1.2%	3.0%	-4.4%
25	Hydrochloric Acid	2014	2888	2574	2450	2468	2693	2803	2392	2996	3228	3268	3013	2800	0.8%	3.2%	-7.1%
26	p-Xylene	795	2119	2266	1696	2057	2132	2390	2518	2578	2801	2673	2600	2715	1.8%	1.5%	4.4%
27	Ethylene Oxide	1933	2610	2469	2491	2767	2850	2715	2715	2393	2977	2516	2678	2623	0.6%	0.7%	-2.1%
28	Ethylene Glycol	1519	2193	2072	2155	2213	1612	2089	2385	2592	2759	2731	2536	2465	1.8%	0.7%	-2.8%
29	Ammonium Sulfate	1894	2136	2185	1769	1956	2067	2093	2080	2189	2333	2384	2539	2230	0.2%	1.4%	-12.2%
30	Cumene	997	1730	1655	1372	1673	1877	1314	1873	2053	2228	2213	2156	2143	2.6%	2.7%	-0.6%
31	Acetic Acid	966	1489	1353	1374	1404	1310	1449	1364	1623	1580	1647	1876	1805	2.9%	5.8%	-3.8%
32	Phenol	854	1284	1289	1088	1319	1445	1421	1558	1921	1781	1903	1769	1743	3.1%	2.3%	-1.5%
33	Butadiene (1,3-)	1551	1400	1493	958	1177	1414	1170	1273	1466	1585	1561	1544	1455	-0.3%	2.7%	-5.8%
34	Propylene Oxide	590	884	865	735	785	893	1188	1225	1285	1500	1515	1483	1453	5.3%	3.5%	-2.0%
35	Carbon Black	1466	1310	1390	1170	1270	1470	1290	1300	1370	1450	1465	1440	1350	-0.3%	0.8%	-6.3%
36	Acrylonitrile	520	915	998	1018	1073	1110	1175	1091	1226	1305	1181	1338	1323	2.9%	3.9%	-1.2%
37	Vinyl Acetate	402	961	968	938	982	1012	1056	855	907	1281	1277	1330	1323	3.2%	9.1%	-0.5%
38	Aluminum Sulfate	1191	1286	1294	1154	1120	1239	1204	1213	1226	1237	1243	1227	1180	-0.9%	-0.6%	-3.8%
39	Cyclohexane	921	982	910	638	828	997	829	1035	1138	1149	1137	1231	1155	2.4%	2.2%	-6.1%
40	Titanium Dioxide	655	727	761	660	760	835	864	924	968	1022	1101	1077	1095	3.7%	3.5%	1.7%
41	Acetone	808	1038	1072	847	930	931	894	955	923	1152	1262	1165	1065	-0.1%	2.2%	-8.6%
42	Sodium Silicate, Anhydrous	628	786	771	664	710	685	692	791	952	812	873	879	895	1.5%	2.5%	1.8%
43	Adipic Acid	541	675	673	655	693	740	763	788	803	815	818	808	775	1.4%	-0.3%	-4.0%
44	Sodium Sulfate	1373	1139	1111	864	914	901	811	841	799	819	755	786	770	-3.6%	-1.7%	-2.0%
45	Isopropyl Alcohol	960	918	835	690	605	697	618	651	686	695	737	728	648	-2.5%	-0.1%	-11.1%
46	Caprolactum	250	455	464	397	488	514	545	555	578	631	654	690	643	3.3%	3.0%	-6.8%
47	Bisphenol A	101	265	278	240	322	381	475	478	500	670	621	575	590	7.8%	4.3%	2.6%
48	Sodium Tripolyphosphate	1208	789	696	651	669	692	612	617	586	549	580	532	570	-2.0%	-1.6%	7.1%
49	Methyl Methacrylate	223	390	446	361	422	459	429	472	515	550	581	591	550	2.1%	3.1%	-6.9%
50	Calcium Chloride	704	811	917	875	857	1088	584	419	462	509	471	518	485	-6.2%	3.0%	-6.4%

Sources: Bureau of the Census, Bureau of the Mines, United States International Trade Commission, CMA estimates

Section 3
U.S. International Trade

The increase in world chemical production has brought with it an even larger increase in international chemical trade. Most chemicals are now manufactured in many production locations around the globe. Prices for many chemicals are set by global supplies and global demand. World exports of chemicals were about $300 billion in 1991. World trade in chemicals reflects an intensely competitive struggle for markets by the producers in a "globalized" industry.

The U.S. chemical industry began a limited export trade in potash and naval stores with the United Kingdom as early as the 18th century. In 1991, exports of U.S.-produced chemicals reached $43.0 billion, over 14% of total world chemical exports, and an amount greater than total U.S. agricultural exports. The U.S. chemical industry competes in a global context and its share of international markets is increasingly in unique products in which it enjoys a distinct technological advantage. Canada represents the largest single national market for U.S. chemical exports, closely followed by Japan. Western Europe, Latin America, and Asia are other large markets.

U.S. imports of chemicals have also increased, reaching $24.2 billion in 1991. Canada is by far the largest exporter of chemicals to the United States, about $4.4 billion in 1991. The U.S. chemical industry has traditionally maintained trade surpluses, even during the second half of the 1980s, a period when the overall U.S. deficit in merchandise trade was often over $100 billion per year. In 1991, the U.S. trade surplus in chemicals reached $18.8 billion, including a $2.3 billion trade surplus with Japan.

The U.S. trade statistics in this section are compiled by the U.S. Department of Commerce and are presented in Standard International Trade Classification (SITC) Revision 3 format.

SITC 51 Organic Chemicals includes hydrocarbons and their derivatives, alcohols, phenols, and other organic compounds.

SITC 52 Inorganic Chemicals includes chlorine and other inorganic elements, acids, metallic salts and other inorganic compounds.

SITC 53 Dyeing, Tanning and Colouring includes dyes, color lakes, tanning extracts, paints, pigments, varnishes, inks and related preparations.

SITC 54 Medicinal and Pharmaceutical Products includes vitamins, antibiotics, hormones, veterinary and other medicaments and related preparations.

SITC 55 Essential Oils and Perfume Materials includes essential oils, perfume materials, perfumes, cosmetics, toilet preparations, polishes, soaps and related cleansing preparations.

SITC 56 Fertilizers includes nitrogenous, phosphatic and other chemical and mineral fertilizers.

SITC 57 Plastics in Primary Form includes polyethylene, PVC, polystyrene and other plastic resins.

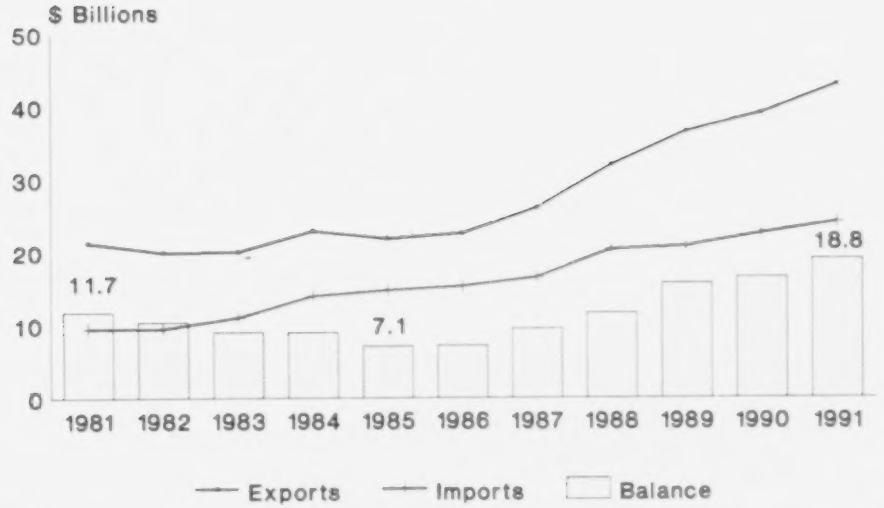
SITC 58 Plastics in Non-Primary Form includes tubes, pipes, hoses, plates, sheets, film, foil, strips, and other shades of plastic.

SITC 59 Chemical Materials and Products includes pesticides, starches, glues, explosives and pyrotechnic products, fuel additives, plasticizers, textile specialities and other miscellaneous chemical products and preparations.

Exports shown in this section are domestic exports only, valued free along ship (F.A.S.). Imports are general imports at customs value, which excludes insurance and freight. In 1990, the Bureau of the Census adjusted its export statistics for 1989 to reflect under-reported exports to Canada and other changes. As a result, the originally reported chemicals trade balance of $15.7 billion was revised to $16.6 billion. The trade surplus data in Table 1.1 and Chart 3.1 reflect the adjustment. The trade data at more detailed levels, however, were not revised by the Census Bureau. As a result, the data in the Section 3 tables do not include the adjustment.

Since the mid-1980's, the chemical industry's trade surplus has steadily expanded, reaching a record high of $18.8 billion in 1991.

Chart 3.1
U.S. Chemical Trade
1981-91



Chemical exports rose by an average of 13.8% per year from 1986 to 1991. In 1991, chemical exports were $43 billion, higher than total U.S. agricultural exports. In 1991, the foreign earnings of U.S. chemical companies and the chemical trade surplus added $23.5 billion to U.S. international accounts.

TABLE 3.1
SUMMARY OF U.S. CHEMICAL TRADE (MILLION DOLLARS)

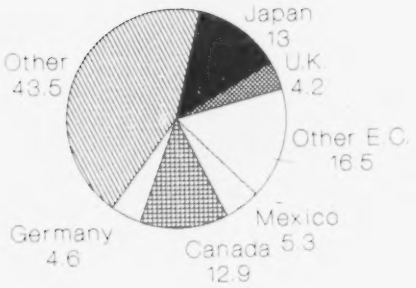
SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	19967	22830	21829	22522	26023	31909	36485	38983	42967	13.8%	10.2%
	Imports	10945	13920	14715	15302	16567	20326	20752	22468	24169	9.6%	7.6%
	Balance	9021	8910	7113	7220	9455	11583	15733	16515	18798		
51 Organic Chemicals	Exports	5349	6111	5997	6423	7717	9704	10609	10400	10928	11.2%	5.1%
	Imports	3503	4338	4765	4883	5508	7250	7042	7392	8157	10.8%	10.4%
	Balance	1846	1773	1232	1539	2209	2454	3567	3008	2771		
52 Inorganic Chemicals	Exports	2966	3506	3625	3683	3789	4289	4319	3816	4102	2.2%	7.5%
	Imports	2301	3111	3029	2930	2668	3147	3231	3234	3299	2.4%	2.0%
	Balance	665	395	596	753	1121	1142	1088	582	803		
53 Dyeing, Tanning &Coloring	Exports	715	731	685	767	952	1100	1097	1588	1648	16.5%	3.7%
	Imports	644	803	855	1069	1267	1302	1133	1288	1416	5.8%	9.9%
	Balance	71	-72	-170	-303	-314	-202	-37	300	232		
54 Medicinal & Pharmaceutical Products	Exports	2217	2316	2418	2662	2718	3262	3660	4103	4606	11.6%	12.3%
	Imports	812	1036	1129	1231	1509	1849	2086	2500	3053	19.9%	22.1%
	Balance	1405	1280	1288	1431	1209	1413	1574	1603	1553		
55 Essential Oils & Perfume Materials	Exports	795	813	772	809	951	1126	1469	1963	2361	23.9%	20.3%
	Imports	452	629	737	876	982	1175	1165	1323	1417	10.1%	7.1%
	Balance	344	183	35	-67	-31	-50	304	639	944		
56 Fertilizers, Manufactured	Exports	1332	2203	1750	929	1084	1199	2821	2575	2980	26.3%	15.8%
	Imports	977	1115	945	837	768	991	999	955	919	1.9%	-3.8%
	Balance	355	1089	805	92	317	208	1822	1619	2061		
57 Plastics in Primary Form	Exports	2737	2926	2730	3121	4033	5503	5727	6429	7537	19.3%	17.2%
	Imports	541	777	861	1006	1113	1373	1687	1974	1930	13.9%	-2.2%
	Balance	2197	2149	1869	2114	2920	4130	4040	4454	5607		
58 Plastics in Non-Primary Form	Exports	1247	1374	1272	1387	1660	2001	2202	2633	2786	15.0%	5.8%
	Imports	754	956	1009	1171	1327	1574	1629	1773	1855	9.6%	4.6%
	Balance	493	419	263	216	333	426	572	860	930		
59 Chemical Materials & Products	Exports	2608	2849	2581	2742	3118	3725	4583	5478	6020	17.0%	9.9%
	Imports	962	1156	1385	1298	1425	1665	1780	2028	2123	10.3%	4.7%
	Balance	1646	1693	1196	1444	1693	2060	2803	3450	3897		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

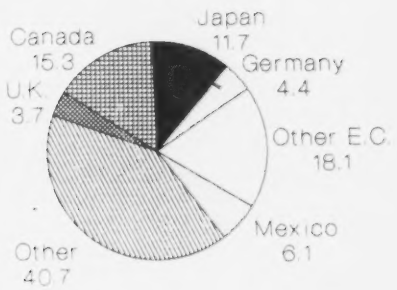
Chart 3.2
U.S. EXPORTS
(Percent of Total)

Country of Destination

1983

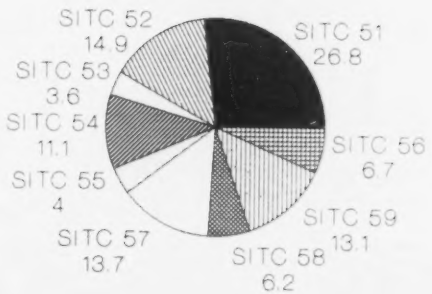


1991

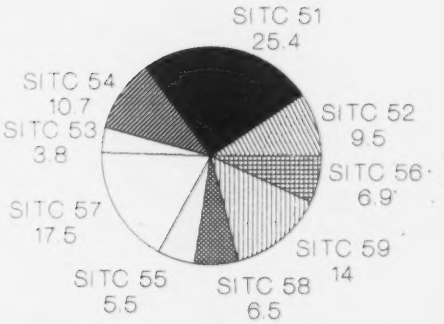


Product Composition

1983



1991

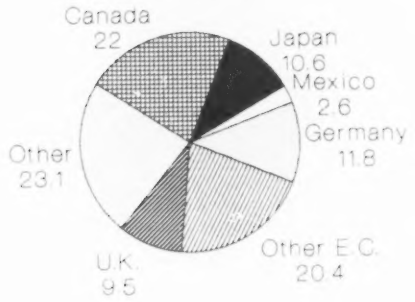


In 1991, the European Community was the largest regional importer of U.S. produced chemicals in 1991. Canada and Japan were the first and second largest individual country markets respectively. Organic chemicals (SITC 51) is the largest export category followed by plastics. The plastics share of chemical exports (SITC 57 and SITC 58) increased by 4.1 percentage points between 1983 and 1991.

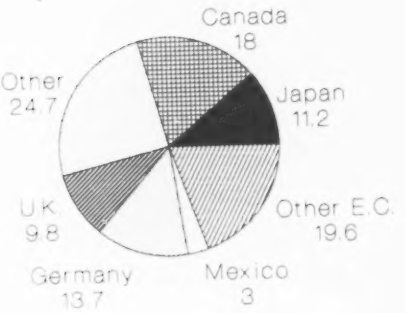
Chart 3.3
U.S. IMPORTS
(Percent of Total)

Country of Origin

1983

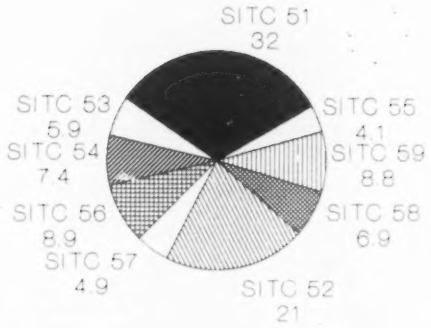


1991

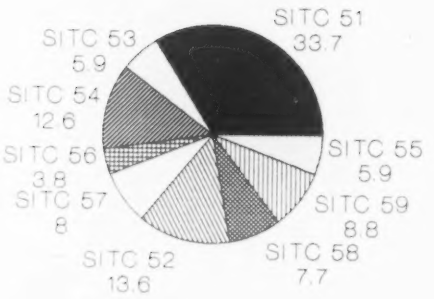


Product Composition

1983



1991



The European Community was also the largest regional exporter of chemicals to the U.S in 1991. The U.S. chemical industry had positive trade balances with Japan ($2.3 billion), Canada ($2.2 billion), Mexico ($1.9 billion), and most other countries. However, Germany, the U.K., France, and Eastern Europe exported more to the U.S. than they imported from it.

TABLE 3.2
SUMMARY OF U.S. CHEMICAL TRADE (PERCENT OF TOTAL)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991
51 Organic Chemicals	Exports	26.8%	26.8%	27.5%	28.5%	29.7%	30.4%	29.1%	26.7%	25.4%
	Imports	32.0%	31.2%	32.4%	31.9%	33.2%	35.7%	33.9%	32.9%	33.7%
52 Inorganic Chemicals	Exports	14.9%	15.4%	16.6%	16.4%	14.6%	13.4%	11.8%	9.8%	9.5%
	Imports	21.0%	22.4%	20.6%	19.1%	16.1%	15.5%	15.6%	14.4%	13.6%
53 Dyeing, Tanning and Coloring	Exports	3.6%	3.2%	3.1%	3.4%	3.7%	3.4%	3.0%	4.1%	3.8%
	Imports	5.9%	5.8%	5.8%	7.0%	7.6%	6.4%	5.5%	5.7%	5.9%
54 Medicinal and Pharmaceutical Products	Exports	11.1%	10.1%	11.1%	11.8%	10.4%	10.2%	10.0%	10.5%	10.7%
	Imports	7.4%	7.4%	7.7%	8.0%	9.1%	9.1%	10.1%	11.1%	12.6%
55 Essential Oils and Perfume Materials	Exports	4.0%	3.6%	3.5%	3.6%	3.7%	3.5%	4.0%	5.0%	5.5%
	Imports	4.1%	4.5%	5.0%	5.7%	5.9%	5.8%	5.6%	5.9%	5.9%
56 Fertilizers, Manufactured	Exports	6.7%	9.7%	8.0%	4.1%	4.2%	3.8%	7.7%	6.6%	6.9%
	Imports	8.9%	8.0%	6.4%	5.5%	4.6%	4.9%	4.8%	4.3%	3.8%
57 Plastics in Primary Form	Exports	13.7%	12.8%	12.5%	13.9%	15.5%	17.2%	15.7%	16.5%	17.5%
	Imports	4.9%	5.6%	5.9%	6.6%	6.7%	6.8%	8.1%	8.8%	8.0%
58 Plastics in Non-Primary Form	Exports	6.2%	6.0%	5.8%	6.2%	6.4%	6.3%	6.0%	6.8%	6.5%
	Imports	6.9%	6.9%	6.9%	7.6%	8.0%	7.7%	7.9%	7.9%	7.7%
59 Chemical Materials & Products	Exports	13.1%	12.5%	11.8%	12.2%	12.0%	11.7%	12.6%	14.1%	14.0%
	Imports	8.8%	8.3%	9.4%	8.5%	8.6%	8.2%	8.6%	9.0%	8.8%
Total Selected Commodities	Exports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Imports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.3
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2576	12.9%	2857	12.5%	2714	12.4%	2613	11.6%	3221	12.4%	3751	11.8%	4210	11.5%	6050	15.5%	6555	15.3%
Japan	2603	13.0%	3000	13.1%	2914	13.3%	3062	13.6%	3401	13.1%	3982	12.5%	4664	12.8%	4582	11.8%	5047	11.7%
United Kingdom	842	4.2%	921	4.0%	837	3.8%	910	4.0%	1087	4.2%	1367	4.3%	1554	4.3%	1527	3.9%	1580	3.7%
Germany	916	4.6%	1078	4.7%	1056	4.8%	1177	5.2%	1177	4.5%	1369	4.3%	1515	4.2%	1775	4.6%	1911	4.4%
Netherlands	941	4.7%	1066	4.7%	1204	5.5%	1184	5.3%	1488	5.7%	1685	5.3%	2033	5.6%	2190	5.6%	2357	5.5%
France	488	2.4%	594	2.6%	665	3.0%	718	3.2%	729	2.8%	833	2.6%	931	2.6%	1107	2.8%	1113	2.6%
Italy	354	1.8%	388	1.7%	438	2.0%	482	2.1%	560	2.2%	638	2.0%	731	2.0%	805	2.1%	909	2.1%
Other E.C.	1519	7.6%	1762	7.7%	1710	7.8%	1800	8.0%	2045	7.9%	2426	7.6%	2994	8.2%	3105	8.0%	3387	7.9%
Total E.C.	5059	25.3%	5810	25.4%	5911	27.1%	6271	27.8%	7085	27.2%	8318	26.1%	9758	26.7%	10510	27.0%	11257	26.2%
Other Developed	1887	9.5%	1954	8.6%	1797	8.2%	1674	7.4%	1906	7.3%	2327	7.3%	2858	7.8%	2687	6.9%	2760	6.4%
Total Developed	12125	60.7%	13620	59.7%	13336	61.1%	13620	60.5%	15612	60.0%	18378	57.6%	21490	58.9%	23829	61.1%	25617	59.6%
Saudi Arabia	273	1.4%	255	1.1%	203	0.9%	180	0.8%	220	0.8%	239	0.7%	213	0.6%	249	0.6%	303	0.7%
Other OPEC	846	4.2%	1029	4.5%	869	4.0%	898	4.0%	1074	4.1%	1282	4.0%	1162	3.2%	1260	3.2%	1463	3.4%
Total OPEC	1119	5.6%	1283	5.6%	1072	4.9%	1078	4.8%	1294	5.0%	1521	4.8%	1375	3.8%	1509	3.9%	1766	4.1%
Brazil	472	2.4%	546	2.4%	489	2.2%	738	3.3%	655	2.5%	644	2.0%	774	2.1%	897	2.3%	949	2.2%
Mexico	1055	5.3%	1255	5.5%	1408	6.4%	1261	5.6%	1431	5.5%	1836	5.8%	2195	6.0%	2298	5.9%	2624	6.1%
Other Latin America	2059	10.3%	2364	10.4%	2031	9.3%	2210	9.8%	2513	9.7%	2954	9.3%	2949	8.1%	3037	7.8%	3483	8.1%
Total Latin America	3585	18.0%	4164	18.2%	3927	18.0%	4209	18.7%	4599	17.7%	5433	17.0%	5918	16.2%	6232	16.0%	7056	16.4%
South Korea	524	2.6%	675	3.0%	598	2.7%	749	3.3%	983	3.8%	1373	4.3%	1642	4.5%	1690	4.3%	1658	3.9%
Singapore	286	1.4%	294	1.3%	253	1.2%	302	1.3%	371	1.4%	481	1.5%	648	1.8%	690	1.8%	751	1.7%
Taiwan	690	3.5%	694	3.0%	542	2.5%	832	3.7%	1115	4.3%	1516	4.8%	1751	4.8%	1529	3.9%	1840	4.3%
Other Asian NICS	271	1.4%	316	1.4%	344	1.6%	389	1.7%	562	2.2%	829	2.6%	692	1.9%	746	1.9%	923	2.1%
Total Asian NICS	1771	8.9%	1979	8.7%	1737	8.0%	2273	10.1%	3031	11.6%	4199	13.2%	4733	13.0%	4656	11.9%	4656	10.8%
Other Developing Countries	1073	5.4%	1406	6.2%	1371	6.3%	1096	4.9%	1121	4.3%	1582	5.0%	2031	5.6%	2013	5.2%	2154	5.0%
Total Developing Countries	7110	35.6%	8188	35.9%	7569	34.7%	8081	35.9%	9306	35.8%	11881	37.2%	13450	36.9%	13762	35.3%	15290	35.6%
China	353	1.8%	645	2.8%	507	2.3%	422	1.9%	748	2.9%	1308	4.1%	1136	3.1%	1054	2.7%	1671	3.9%
USSR	305	1.5%	266	1.2%	318	1.5%	294	1.3%	282	1.1%	277	0.9%	332	0.9%	280	0.7%	326	0.8%
Eastern Europe	67	0.3%	101	0.4%	90	0.4%	94	0.4%	65	0.3%	59	0.2%	77	0.2%	58	0.1%	62	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	1	0.0%
Total CPE	724	3.6%	1012	4.4%	915	4.2%	810	3.6%	1095	4.2%	1644	5.2%	1545	4.2%	1392	3.6%	2060	4.8%
World	19967	100.0%	22830	100.0%	21829	100.0%	22522	100.0%	26023	100.0%	31909	100.0%	36485	100.0%	38983	100.0%	42967	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.4
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2408	22.0%	3110	22.3%	2882	19.6%	2783	18.2%	3074	18.6%	3841	18.9%	3934	19.0%	4305	19.2%	4352	18.0%
Japan	1155	10.6%	1408	10.1%	1526	10.4%	1922	12.6%	2301	13.9%	2399	11.8%	2373	11.4%	2391	10.6%	2706	11.2%
United Kingdom	1036	9.5%	1296	9.3%	1235	8.4%	1529	10.0%	1503	9.1%	2126	10.5%	2030	9.8%	2072	9.2%	2367	9.8%
Germany	1295	11.8%	1646	11.8%	1559	10.6%	1907	12.5%	2236	13.5%	2674	13.2%	2828	13.6%	3117	13.9%	3304	13.7%
Netherlands	472	4.3%	522	3.8%	682	4.6%	558	3.6%	581	3.5%	726	3.6%	711	3.4%	767	3.4%	668	2.8%
France	889	8.1%	1186	8.5%	1466	10.0%	1258	8.2%	1443	8.7%	1606	7.9%	1502	7.2%	1541	6.9%	1696	7.0%
Italy	323	3.0%	456	3.3%	588	4.0%	517	3.4%	639	3.9%	747	3.7%	722	3.5%	799	3.6%	873	3.6%
Other E.C.	549	5.0%	765	5.5%	805	5.5%	795	5.2%	931	5.6%	1187	5.8%	1365	6.6%	1433	6.4%	1511	6.2%
Total E.C.	4565	41.7%	5870	42.2%	6335	43.1%	6563	42.9%	7333	44.3%	9066	44.6%	9158	44.1%	9729	43.3%	10418	43.1%
Other Developed	1011	9.2%	1111	8.0%	1351	9.2%	1492	9.7%	1359	8.2%	1744	8.6%	1755	8.5%	2037	9.1%	2328	9.6%
Total Developed	9139	83.5%	11500	82.6%	12094	82.2%	12760	83.4%	14067	84.9%	17050	83.9%	17221	83.0%	18462	82.2%	19804	81.9%
Saudi Arabia	1	0.0%	1	0.0%	40	0.3%	81	0.5%	56	0.3%	83	0.4%	95	0.5%	87	0.4%	88	0.4%
Other OPEC	200	1.8%	54	0.4%	63	0.4%	72	0.5%	75	0.5%	93	0.5%	91	0.4%	83	0.4%	98	0.4%
Total OPEC	201	1.8%	55	0.4%	103	0.7%	153	1.0%	131	0.8%	176	0.9%	187	0.9%	171	0.8%	187	0.8%
Brazil	241	2.2%	409	2.9%	408	2.8%	274	1.8%	230	1.4%	340	1.7%	315	1.5%	306	1.4%	277	1.1%
Mexico	287	2.6%	509	3.7%	451	3.1%	330	2.2%	393	2.4%	567	2.8%	582	2.8%	665	3.0%	721	3.0%
Other Latin America	494	4.5%	413	3.0%	437	3.0%	450	2.9%	441	2.7%	639	3.1%	775	3.7%	795	3.5%	852	3.5%
Total Latin America	1022	9.3%	1330	9.6%	1297	8.8%	1054	6.9%	1064	6.4%	1546	7.6%	1671	8.1%	1766	7.9%	1850	7.7%
South Korea	58	0.5%	80	0.6%	90	0.6%	135	0.9%	152	0.9%	188	0.9%	185	0.9%	253	1.1%	242	1.0%
Singapore	8	0.1%	18	0.1%	68	0.5%	123	0.8%	144	0.9%	159	0.8%	176	0.8%	379	1.7%	496	2.1%
Taiwan	183	1.7%	221	1.6%	238	1.6%	283	1.8%	308	1.9%	336	1.7%	349	1.7%	350	1.6%	396	1.6%
Other Asian NICS	9	0.1%	17	0.1%	20	0.1%	26	0.2%	29	0.2%	35	0.2%	34	0.2%	43	0.2%	37	0.2%
Total Asian NICS	257	2.4%	337	2.4%	416	2.8%	567	3.7%	633	3.8%	718	3.5%	744	3.6%	1024	4.6%	1171	4.8%
Other Developing Countries	168	1.5%	253	1.8%	290	2.0%	302	2.0%	336	2.0%	438	2.2%	480	2.3%	519	2.3%	572	2.4%
Total Developing Countries	1484	13.6%	1944	14.0%	2085	14.2%	2042	13.3%	2140	12.9%	2827	13.9%	3050	14.7%	3427	15.3%	3710	15.3%
China	126	1.2%	151	1.1%	157	1.1%	174	1.1%	196	1.2%	230	1.1%	273	1.3%	337	1.5%	392	1.6%
USSR	144	1.3%	207	1.5%	196	1.3%	163	1.1%	93	0.6%	116	0.6%	108	0.5%	163	0.7%	184	0.8%
Eastern Europe	53	0.5%	117	0.8%	183	1.2%	163	1.1%	72	0.4%	103	0.5%	100	0.5%	80	0.4%	79	0.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	323	3.0%	475	3.4%	536	3.6%	500	3.3%	361	2.2%	449	2.2%	481	2.3%	580	2.6%	655	2.7%
World	10945	100.0%	13920	100.0%	14715	100.0%	15302	100.0%	16567	100.0%	20326	100.0%	20752	100.0%	22468	100.0%	24169	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.5
TRADE BALANCE (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	168	-254	-168	-170	147	-90	276	1745	2203
Japan	1447	1591	1388	1140	1100	1582	2291	2191	2341
United Kingdom	-195	-375	-398	-618	-416	-759	-476	-545	-787
Germany	-379	-567	-502	-730	-1059	-1305	-1313	-1341	-1393
Netherlands	469	544	522	626	907	959	1322	1423	1690
France	-401	-592	-801	-541	-714	-773	-571	-434	-584
Italy	31	-67	-150	-35	-79	-109	8	6	36
Other E.C.	970	997	905	1006	1114	1240	1629	1672	1877
Total E.C.	495	-60	-424	-292	-248	-748	599	781	839
Other Developed	876	842	446	183	546	583	1103	650	432
Total Developed	2986	2120	1242	861	1545	1327	4270	5367	5814
Saudi Arabia	271	253	163	99	164	156	117	161	215
Other OPEC	646	975	806	826	999	1189	1071	1177	1365
Total OPEC	918	1228	969	925	1163	1345	1188	1338	1580
Brazil	231	137	80	464	425	304	459	591	672
Mexico	767	746	957	931	1038	1269	1613	1633	1903
Other Latin America	1565	1951	1594	1760	2072	2314	2174	2242	2631
Total Latin America	2563	2834	2631	3155	3534	3887	4246	4466	5207
South Korea	465	595	508	615	831	1185	1457	1437	1416
Singapore	279	276	185	179	227	322	472	312	256
Taiwan	507	472	304	549	807	1180	1402	1179	1444
Other Asian NICS	262	299	324	363	534	794	658	703	886
Total Asian NICS	1514	1642	1321	1706	2399	3481	3989	3632	3485
Other Developing Countries	905	1153	1082	794	785	1144	1551	1494	1583
Total Developing Countries	5626	6244	5484	6038	7166	9054	10400	10335	11580
China	226	494	350	248	552	1078	862	716	1279
USSR	161	59	122	131	189	161	224	117	142
Eastern Europe	14	-16	-93	-69	-6	-44	-23	-22	-17
Other CPE	0	0	0	0	0	1	0	0	1
Total CPE	401	536	379	310	735	1195	1063	812	1405
World	9021	8910	7113	7220	9455	11583	15733	16515	18798

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.6
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	604	11.3%	667	10.9%	636	10.6%	642	10.0%	741	9.6%	867	8.9%	941	8.9%	1123	10.8%	1088	10.0%
Japan	653	12.2%	704	11.5%	690	11.5%	743	11.6%	899	11.7%	1120	11.5%	1175	11.1%	1124	10.8%	1177	10.8%
United Kingdom	248	4.6%	259	4.2%	244	4.1%	251	3.9%	256	3.3%	391	4.0%	372	3.5%	350	3.4%	361	3.3%
Germany	138	2.6%	180	2.9%	195	3.2%	206	3.2%	247	3.2%	344	3.5%	379	3.6%	438	4.2%	488	4.5%
Netherlands	473	8.8%	491	8.0%	569	9.5%	522	8.1%	762	9.9%	769	7.9%	955	9.0%	825	7.9%	890	8.1%
France	84	1.6%	93	1.5%	90	1.5%	82	1.3%	96	1.2%	130	1.3%	131	1.2%	194	1.9%	205	1.9%
Italy	109	2.0%	104	1.7%	150	2.5%	153	2.4%	177	2.3%	165	1.7%	175	1.7%	196	1.9%	205	1.9%
Other E.C.	43	0.8%	50	0.8%	50	0.8%	56	0.9%	665	8.6%	820	8.4%	1023	9.6%	1036	10.0%	1147	10.5%
Total E.C.	1476	27.6%	1629	26.7%	1745	29.1%	1773	27.6%	2202	28.5%	2619	27.0%	3036	28.6%	3038	29.2%	3295	30.1%
Other Developed	496	9.3%	555	9.1%	470	7.8%	420	6.5%	519	6.7%	674	6.9%	833	7.8%	669	6.4%	727	6.7%
Total Developed	3229	60.4%	3555	58.2%	3541	59.1%	3578	55.7%	4362	56.5%	5280	54.4%	5984	56.4%	5954	57.3%	6287	57.5%
Saudi Arabia	9	0.2%	18	0.3%	21	0.3%	26	0.4%	31	0.4%	37	0.4%	30	0.3%	28	0.3%	26	0.2%
Other OPEC	187	3.5%	258	4.2%	229	3.8%	236	3.7%	288	3.7%	341	3.5%	251	2.4%	299	2.9%	322	2.9%
Total OPEC	196	3.7%	276	4.5%	250	4.2%	262	4.1%	320	4.1%	378	3.9%	281	2.6%	327	3.1%	348	3.2%
Brazil	168	3.1%	197	3.2%	197	3.3%	303	4.7%	279	3.6%	257	2.7%	285	2.7%	433	4.2%	359	3.3%
Mexico	420	7.9%	544	8.9%	604	10.1%	476	7.4%	523	6.8%	665	6.9%	680	6.4%	598	5.7%	705	6.4%
Other Latin America	539	10.1%	655	10.7%	523	8.7%	618	9.6%	673	8.7%	789	8.1%	692	6.5%	719	6.9%	768	7.0%
Total Latin America	1127	21.1%	1396	22.8%	1323	22.1%	1396	21.7%	1475	19.1%	1712	17.6%	1657	15.6%	1750	16.8%	1832	16.8%
South Korea	259	4.8%	325	5.3%	290	4.8%	383	6.0%	472	6.1%	718	7.4%	793	7.5%	692	6.6%	597	5.5%
Singapore	64	1.2%	75	1.2%	76	1.3%	97	1.5%	106	1.4%	165	1.7%	198	1.9%	220	2.1%	205	1.9%
Taiwan	275	5.1%	248	4.1%	287	4.8%	475	7.4%	669	8.7%	942	9.7%	1051	9.9%	865	8.3%	1033	9.5%
Other Asian NICS	73	1.4%	67	1.1%	63	1.1%	57	0.9%	101	1.3%	134	1.4%	107	1.0%	108	1.0%	145	1.3%
Total Asian NICS	671	12.6%	716	11.7%	717	12.0%	1011	15.7%	1348	17.5%	1960	20.2%	2149	20.3%	1884	18.1%	1980	18.1%
Other Developing Countries	219	4.1%	255	4.2%	224	3.7%	253	3.9%	281	3.6%	350	3.6%	392	3.7%	406	3.9%	394	3.6%
Total Developing Countries	2080	38.9%	2445	40.0%	2352	39.2%	2741	42.7%	3185	41.3%	4121	42.5%	4318	40.7%	4184	40.2%	4352	39.8%
China	33	0.6%	98	1.6%	89	1.5%	81	1.3%	153	2.0%	280	2.9%	286	2.7%	245	2.4%	270	2.5%
USSR	0	0.0%	4	0.1%	2	0.0%	9	0.1%	6	0.1%	10	0.1%	6	0.1%	4	0.0%	14	0.1%
Eastern Europe	7	0.1%	9	0.1%	12	0.2%	15	0.2%	11	0.1%	13	0.1%	15	0.1%	12	0.1%	5	0.0%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	40	0.8%	111	1.8%	103	1.7%	104	1.6%	170	2.2%	303	3.1%	307	2.9%	262	2.5%	290	2.7%
World	5349	100.0%	6111	100.0%	5997	100.0%	6423	100.0%	7717	100.0%	9704	100.0%	10609	100.0%	10400	100.0%	10928	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.7
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	546	15.6%	575	13.2%	585	12.3%	463	9.5%	529	9.3%	803	11.1%	604	8.6%	818	11.1%	757	9.3%
Japan	404	11.5%	480	11.1%	524	11.0%	681	13.9%	814	14.8%	859	11.8%	926	13.1%	843	11.4%	983	12.0%
United Kingdom	488	13.9%	578	13.3%	572	12.0%	640	13.1%	704	12.8%	914	12.6%	882	12.5%	769	10.4%	917	11.2%
Germany	466	13.3%	594	13.7%	585	12.3%	655	13.4%	752	13.7%	1067	14.7%	1070	15.2%	1075	14.5%	1138	14.0%
Netherlands	288	8.2%	331	7.6%	383	8.0%	279	5.7%	316	5.7%	421	5.8%	361	5.1%	396	5.4%	316	3.9%
France	220	6.3%	279	6.4%	309	6.5%	282	5.8%	367	6.7%	438	6.0%	399	5.7%	418	5.7%	453	5.5%
Italy	148	4.2%	203	4.7%	287	6.0%	213	4.4%	258	4.7%	320	4.4%	331	4.7%	355	4.8%	385	4.7%
Other E.C.	233	6.7%	334	7.7%	331	6.9%	352	7.2%	382	6.9%	530	7.3%	560	7.9%	583	7.9%	632	7.7%
Total E.C.	1843	52.6%	2320	53.5%	2467	51.8%	2420	49.6%	2779	50.4%	3690	50.9%	3603	51.2%	3595	48.6%	3840	47.1%
Other Developed	238	6.8%	281	6.5%	359	7.5%	372	7.6%	455	8.3%	656	9.1%	549	7.8%	577	7.8%	712	8.7%
Total Developed	3031	86.5%	3655	84.3%	3935	82.6%	3936	80.6%	4577	83.1%	6008	82.9%	5683	80.7%	5833	78.9%	6292	77.1%
Saudi Arabia	1	0.0%	1	0.0%	37	0.8%	66	1.4%	50	0.9%	69	1.0%	79	1.1%	75	1.0%	77	0.9%
Other OPEC	3	0.1%	4	0.1%	14	0.3%	15	0.3%	16	0.3%	15	0.2%	10	0.1%	17	0.2%	56	0.7%
Total OPEC	4	0.1%	5	0.1%	51	1.1%	81	1.7%	65	1.2%	84	1.2%	90	1.3%	92	1.2%	133	1.6%
Brazil	178	5.1%	286	6.6%	223	4.7%	169	3.5%	137	2.5%	188	2.6%	134	1.9%	127	1.7%	140	1.7%
Mexico	37	1.1%	73	1.7%	51	1.1%	49	1.0%	65	1.2%	127	1.8%	158	2.2%	157	2.1%	249	3.0%
Other Latin America	121	3.4%	122	2.8%	207	4.4%	232	4.7%	227	4.1%	319	4.4%	438	6.2%	464	6.3%	512	6.3%
Total Latin America	336	9.6%	480	11.1%	481	10.1%	450	9.2%	428	7.8%	634	8.7%	730	10.4%	748	10.1%	901	11.0%
South Korea	34	1.0%	39	0.9%	43	0.9%	61	1.2%	67	1.2%	77	1.1%	71	1.0%	73	1.0%	74	0.9%
Singapore	4	0.1%	8	0.2%	61	1.3%	113	2.3%	129	2.3%	134	1.9%	157	2.2%	306	4.1%	414	5.1%
Taiwan	15	0.4%	21	0.5%	30	0.6%	34	0.7%	34	0.6%	48	0.7%	38	0.5%	42	0.6%	52	0.6%
Other Asian NICS	1	0.0%	2	0.0%	2	0.0%	3	0.1%	3	0.1%	8	0.1%	6	0.1%	9	0.1%	6	0.1%
Total Asian NICS	54	1.5%	70	1.6%	136	2.9%	212	4.3%	232	4.2%	267	3.7%	272	3.9%	430	5.8%	546	6.7%
Other Developing Countries	33	0.9%	53	1.2%	81	1.7%	115	2.4%	122	2.2%	170	2.4%	182	2.6%	201	2.7%	226	2.8%
Total Developing Countries	426	12.2%	608	14.0%	745	15.6%	852	17.5%	844	15.3%	1151	15.9%	1269	18.0%	1466	19.8%	1758	21.6%
China	33	0.9%	42	1.0%	32	0.7%	43	0.9%	43	0.8%	51	0.7%	60	0.9%	71	1.0%	87	1.1%
USSR	2	0.1%	12	0.3%	20	0.4%	19	0.4%	17	0.3%	15	0.2%	15	0.2%	10	0.1%	7	0.1%
Eastern Europe	10	0.3%	21	0.5%	33	0.7%	33	0.7%	27	0.5%	26	0.4%	15	0.2%	12	0.2%	13	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	45	1.3%	75	1.7%	84	1.8%	95	1.9%	87	1.6%	92	1.3%	91	1.3%	93	1.3%	107	1.3%
World	3503	100.0%	4338	100.0%	4765	100.0%	4883	100.0%	5508	100.0%	7250	100.0%	7042	100.0%	7392	100.0%	8157	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.8
U.S. TRADE BALANCE (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	58	92	51	178	212	64	337	306	331
Japan	249	224	166	62	85	261	249	281	194
United Kingdom	-240	-32[illegible]	-328	-389	-448	-523	-510	-419	-556
Germany	-328	-415	-390	-449	-506	-723	-691	-637	-651
Netherlands	185	160	186	243	446	348	594	429	574
France	-136	-186	-220	-199	-271	-308	-268	-224	-247
Italy	-39	-99	-137	-60	-81	-155	-156	-159	-180
Other E.C.	-190	-284	-281	-296	284	290	464	453	515
Total E.C.	-367	-691	-721	-647	-576	-1071	-568	-557	-546
Other Developed	258	275	111	48	64	18	283	92	15
Total Developed	197	-100	-394	-358	-215	-728	301	121	-6
Saudi Arabia	8	17	-16	-40	-18	-32	-50	-47	-52
Other OPEC	184	254	215	221	272	326	241	282	266
Total OPEC	192	271	199	181	254	294	191	235	215
Brazil	-10	-89	-26	134	143	70	151	306	219
Mexico	383	471	553	426	458	538	522	441	456
Other Latin America	418	533	315	386	446	471	254	255	256
Total Latin America	791	916	842	946	1047	1078	927	1002	931
South Korea	225	286	247	323	405	641	722	618	523
Singapore	61	67	16	-17	-23	31	42	-86	-209
Taiwan	259	227	257	441	635	895	1012	822	981
Other Asian NICS	73	65	61	53	98	126	101	99	139
Total Asian NICS	618	646	580	800	1115	1693	1877	1453	1434
Other Developing Countries	186	202	144	138	159	180	209	205	167
Total Developing Countries	1653	1837	1606	1889	2341	2970	3050	2718	2594
China	1	56	58	38	110	229	226	174	183
USSR	-2	-8	-18	-10	-12	-5	-9	-6	7
Eastern Europe	-4	-12	-21	-19	-16	-13	0	0	-7
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	-5	36	19	9	83	212	216	169	183
World	1846	1773	1232	1539	2209	2454	3567	3008	2771

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.9
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	297	10.0%	312	8.9%	329	9.1%	345	9.4%	387	10.2%	484	11.3%	483	11.2%	460	12.0%	489	11.9%
Japan	632	21.3%	834	23.8%	820	22.6%	909	24.7%	872	23.0%	936	21.8%	1130	26.2%	963	25.2%	1130	27.5%
United Kingdom	84	2.8%	114	3.2%	71	2.0%	89	2.4%	168	4.4%	149	3.5%	203	4.7%	126	3.3%	134	3.3%
Germany	370	12.5%	417	11.9%	344	9.5%	341	9.2%	270	7.1%	244	5.7%	257	6.0%	241	6.3%	239	5.8%
Netherlands	63	2.1%	95	2.7%	162	4.5%	153	4.2%	163	4.3%	168	3.9%	177	4.1%	172	4.5%	169	4.1%
France	31	1.0%	138	3.9%	207	5.7%	243	6.6%	159	4.2%	129	3.0%	95	2.2%	56	1.5%	67	1.6%
Italy	16	0.5%	18	0.5%	29	0.8%	38	1.0%	54	1.4%	50	1.2%	43	1.0%	52	1.4%	45	1.1%
Other E.C.	89	3.0%	202	5.8%	217	6.0%	131	3.5%	175	4.6%	167	3.9%	164	3.8%	109	2.9%	142	3.5%
Total E.C.	653	22.0%	984	28.1%	1030	28.4%	995	27.0%	989	26.1%	906	21.1%	939	21.7%	757	19.8%	795	19.4%
Other Developed	395	13.3%	283	8.1%	356	9.8%	246	6.7%	222	5.9%	309	7.2%	305	7.1%	305	8.0%	294	7.2%
Total Developed	1977	66.7%	2412	68.8%	2534	69.9%	2496	67.8%	2470	65.2%	2636	61.4%	2857	66.2%	2485	65.1%	2706	66.0%
Saudi Arabia	15	0.5%	17	0.5%	9	0.3%	8	0.2%	10	0.3%	16	0.4%	7	0.2%	5	0.1%	8	0.2%
Other OPEC	100	3.4%	136	3.9%	101	2.8%	101	2.7%	139	3.7%	181	4.2%	151	3.5%	174	4.6%	205	5.0%
Total OPEC	115	3.9%	154	4.4%	110	3.0%	109	3.0%	148	3.9%	196	4.6%	158	3.7%	179	4.7%	213	5.2%
Brazil	54	1.8%	74	2.1%	72	2.0%	114	3.1%	109	2.9%	100	2.3%	109	2.5%	76	2.0%	81	2.0%
Mexico	114	3.8%	115	3.3%	136	3.8%	127	3.4%	168	4.4%	182	4.2%	205	4.8%	223	5.8%	259	6.3%
Other Latin America	208	7.0%	249	7.1%	237	6.5%	262	7.1%	316	8.3%	436	10.2%	372	8.6%	393	10.3%	445	10.9%
Total Latin America	376	12.7%	439	12.5%	446	12.3%	502	13.6%	593	15.7%	718	16.7%	686	15.9%	691	18.1%	785	19.1%
South Korea	58	2.0%	83	2.4%	79	2.2%	83	2.2%	123	3.3%	171	4.0%	195	4.5%	194	5.1%	199	4.9%
Singapore	11	0.4%	10	0.3%	9	0.3%	12	0.3%	15	0.4%	18	0.4%	25	0.6%	21	0.6%	18	0.4%
Taiwan	157	5.3%	124	3.5%	64	1.8%	97	2.6%	59	1.6%	80	1.9%	166	3.9%	129	3.4%	94	2.3%
Other Asian NICS	13	0.5%	30	0.9%	64	1.8%	61	1.7%	52	1.4%	35	0.8%	55	1.3%	29	0.8%	32	0.8%
Total Asian NICS	240	8.1%	246	7.0%	217	6.0%	253	6.9%	250	6.6%	304	7.1%	442	10.2%	375	9.8%	343	8.4%
Other Developing Countries	119	4.0%	181	5.2%	234	6.5%	215	5.8%	172	4.5%	280	6.5%	172	4.0%	164	4.3%	163	4.0%
Total Developing Countries	788	26.6%	925	26.4%	926	25.5%	1011	27.4%	1061	28.0%	1371	32.0%	1357	31.4%	1294	33.9%	1353	33.0%
China	20	0.7%	19	0.5%	18	0.5%	66	1.8%	155	4.1%	188	4.4%	82	1.9%	20	0.5%	31	0.8%
USSR	169	5.7%	143	4.1%	132	3.6%	86	2.3%	87	2.3%	80	1.9%	15	0.4%	5	0.1%	5	0.1%
Eastern Europe	12	0.4%	7	0.2%	15	0.4%	25	0.7%	17	0.5%	15	0.3%	7	0.2%	12	0.3%	6	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	201	6.8%	169	4.8%	165	4.6%	177	4.8%	259	6.8%	282	6.6%	105	2.4%	37	1.0%	43	1.0%
World	2966	100.0%	3506	100.0%	3625	100.0%	3683	100.0%	3789	100.0%	4289	100.0%	4319	100.0%	3816	100.0%	4102	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.10
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	686	29.8%	1124	36.1%	968	31.9%	978	33.4%	1065	39.9%	1117	35.5%	1251	38.7%	1061	32.8%	1025	31.1%
Japan	106	4.6%	107	3.4%	110	3.6%	110	3.8%	157	5.9%	151	4.8%	164	5.1%	158	4.9%	185	5.6%
United Kingdom	174	7.5%	203	6.5%	127	4.2%	276	9.4%	113	4.2%	314	10.0%	223	6.9%	244	7.5%	197	6.0%
Germany	176	7.7%	271	8.7%	169	5.6%	256	8.7%	243	9.1%	259	8.2%	326	10.1%	422	13.1%	429	13.0%
Netherlands	32	1.4%	20	0.6%	66	2.2%	32	1.1%	33	1.2%	44	1.4%	53	1.6%	60	1.9%	66	2.0%
France	298	12.9%	416	13.4%	636	21.0%	378	12.9%	418	15.7%	376	11.9%	254	7.9%	187	5.8%	261	7.9%
Italy	13	0.6%	16	0.5%	43	1.4%	40	1.4%	40	1.5%	46	1.5%	40	1.2%	47	1.5%	53	1.6%
Other E.C.	42	1.8%	54	1.7%	86	2.9%	55	1.9%	50	1.9%	72	2.3%	68	2.1%	60	1.9%	64	1.9%
Total E.C.	734	31.9%	980	31.5%	1127	37.2%	1039	35.5%	897	33.6%	1111	35.3%	964	29.8%	1021	31.6%	1070	32.4%
Other Developed	352	15.3%	324	10.4%	357	11.8%	420	14.3%	167	6.2%	235	7.5%	190	5.9%	239	7.4%	301	9.1%
Total Developed	1879	81.6%	2535	81.5%	2561	84.6%	2547	86.9%	2286	85.7%	2613	83.0%	2569	79.5%	2479	76.7%	2582	78.3%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.1%	7	0.2%	11	0.3%	4	0.1%	5	0.2%
Other OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	2	0.1%	4	0.1%	16	0.5%	7	0.2%	5	0.1%
Total OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	4	0.2%	10	0.3%	27	0.8%	11	0.3%	10	0.3%
Brazil	11	0.5%	26	0.8%	27	0.9%	24	0.8%	19	0.7%	30	1.0%	59	1.8%	61	1.9%	34	1.0%
Mexico	166	7.2%	173	5.5%	134	4.4%	124	4.2%	137	5.1%	193	6.1%	204	6.3%	236	7.3%	182	5.5%
Other Latin America	98	4.3%	161	5.2%	98	3.2%	67	2.3%	74	2.8%	115	3.6%	162	5.0%	134	4.1%	168	5.1%
Total Latin America	275	11.9%	360	11.6%	259	8.6%	215	7.3%	230	8.6%	338	10.7%	425	13.2%	431	13.3%	384	11.6%
South Korea	5	0.2%	6	0.2%	3	0.1%	3	0.1%	3	0.1%	5	0.2%	6	0.2%	3	0.1%	4	0.1%
Singapore	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%
Taiwan	5	0.2%	6	0.2%	6	0.2%	8	0.3%	8	0.3%	10	0.3%	10	0.3%	10	0.3%	9	0.3%
Other Asian NICS	0	0.0%	1	0.0%	3	0.1%	3	0.1%	3	0.1%	5	0.1%	7	0.2%	6	0.2%	7	0.2%
Total Asian NICS	10	0.4%	14	0.5%	12	0.4%	15	0.5%	14	0.5%	20	0.6%	23	0.7%	20	0.6%	20	0.6%
Other Developing Countries	19	0.8%	22	0.7%	30	1.0%	31	1.0%	27	1.0%	30	0.9%	47	1.4%	41	1.3%	55	1.7%
Total Developing Countries	305	13.2%	399	12.8%	306	10.1%	261	8.9%	273	10.2%	394	12.5%	517	16.0%	498	15.4%	464	14.1%
China	15	0.6%	31	1.0%	38	1.3%	33	1.1%	39	1.5%	53	1.7%	57	1.8%	99	3.1%	91	2.8%
USSR	98	4.3%	142	4.6%	119	3.9%	84	2.9%	64	2.4%	77	2.4%	83	2.6%	151	4.7%	155	4.7%
Eastern Europe	5	0.2%	4	0.1%	4	0.1%	5	0.2%	6	0.2%	10	0.3%	4	0.1%	6	0.2%	7	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	119	5.1%	177	5.7%	161	5.3%	122	4.2%	109	4.1%	140	4.4%	145	4.5%	256	7.9%	253	7.7%
World	2301	100.0%	3111	100.0%	3029	100.0%	2930	100.0%	2668	100.0%	3147	100.0%	3231	100.0%	3234	100.0%	3299	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.11
TRADE BALANCE (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	-389	-812	-639	-633	-678	-633	-768	-602	-537
Japan	526	727	709	799	714	786	966	805	945
United Kingdom	-89	-90	-56	-187	55	-165	-19	-117	-63
Germany	194	146	175	84	27	-15	-69	-181	-190
Netherlands	31	75	96	121	131	125	124	112	103
France	-267	-277	-429	-136	-259	-247	-159	-131	-194
Italy	3	2	-14	-2	14	4	3	4	-9
Other E.C.	47	147	131	75	125	94	96	48	78
Total E.C.	-81	3	-97	-44	92	-205	-25	-264	-276
Other Developed	42	-41	-1	-173	56	75	115	67	-8
Total Developed	98	-123	-27	-51	184	22	288	6	125
Saudi Arabia	15	17	9	8	8	9	-4	1	3
Other OPEC	94	120	90	98	136	177	135	168	200
Total OPEC	108	137	99	106	144	186	131	168	203
Brazil	44	48	45	90	90	70	50	14	46
Mexico	-52	-57	2	2	31	-11	1	-13	77
Other Latin America	110	88	139	195	242	322	210	259	278
Total Latin America	102	79	186	287	363	380	261	260	401
South Korea	53	77	76	80	121	166	189	191	195
Singapore	11	9	9	11	15	18	25	20	18
Taiwan	152	118	58	89	51	70	156	119	84
Other Asian NICS	13	29	61	58	49	31	48	24	25
Total Asian NICS	230	232	205	238	236	285	419	354	323
Other Developing Countries	100	159	204	184	145	251	125	123	109
Total Developing Countries	483	526	620	750	787	977	840	796	889
China	5	-11	-20	33	116	134	25	-79	-59
USSR	71	1	13	2	23	3	-68	-147	-150
Eastern Europe	7	3	11	19	11	5	3	6	0
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	83	-8	4	55	150	143	-40	-219	-210
World	665	395	596	753	1121	1142	1088	582	803

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.12
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	164	22.9%	179	24.5%	172	25.1%	156	20.4%	223	23.4%	227	20.6%	230	20.9%	421	26.5%	482	29.2%
Japan	51	7.1%	56	7.6%	62	9.0%	68	8.9%	76	8.0%	95	8.6%	93	8.5%	116	7.3%	113	6.8%
United Kingdom	40	5.6%	35	4.8%	29	4.3%	34	4.4%	43	4.5%	58	5.2%	70	6.3%	104	6.5%	90	5.4%
Germany	26	3.6%	27	3.7%	27	4.0%	29	3.8%	44	4.6%	44	4.0%	37	3.4%	54	3.4%	53	3.2%
Netherlands	35	5.0%	37	5.0%	35	5.1%	45	5.8%	47	5.0%	60	5.4%	44	4.0%	59	3.7%	50	3.0%
France	16	2.2%	13	1.8%	12	1.8%	19	2.5%	24	2.5%	23	2.1%	16	1.5%	19	1.2%	29	1.8%
Italy	11	1.5%	10	1.3%	8	1.2%	9	1.2%	13	1.4%	14	1.2%	13	1.2%	16	1.0%	17	1.0%
Other E.C.	41	5.7%	34	4.7%	31	4.5%	47	6.2%	53	5.6%	80	7.3%	81	7.4%	151	9.5%	130	7.9%
Total E.C.	168	23.5%	155	21.3%	143	20.8%	183	23.9%	224	23.6%	278	25.3%	261	23.8%	402	25.3%	368	22.3%
Other Developed	48	6.7%	51	7.0%	47	6.9%	55	7.2%	56	5.9%	70	6.3%	73	6.7%	87	5.5%	79	4.8%
Total Developed	431	60.3%	441	60.3%	424	61.9%	463	60.3%	580	60.9%	670	60.8%	657	59.9%	1026	64.6%	1040	63.2%
Saudi Arabia	30	4.2%	19	2.6%	12	1.7%	11	1.5%	13	1.4%	14	1.2%	14	1.3%	12	0.8%	17	1.0%
Other OPEC	29	4.0%	38	5.2%	31	4.5%	31	4.1%	40	4.2%	50	4.5%	37	3.4%	31	1.9%	43	2.6%
Total OPEC	58	8.2%	58	7.9%	43	6.3%	42	5.5%	54	5.6%	63	5.7%	51	4.7%	43	2.7%	60	3.6%
Brazil	12	1.7%	10	1.4%	8	1.2%	14	1.8%	13	1.3%	14	1.3%	20	1.9%	22	1.4%	34	2.1%
Mexico	38	5.3%	45	6.1%	46	6.7%	48	6.3%	58	6.1%	67	6.1%	69	6.2%	98	6.2%	114	6.9%
Other Latin America	81	11.3%	86	11.8%	77	11.2%	86	11.1%	106	11.2%	115	10.4%	101	9.2%	113	7.1%	126	7.7%
Total Latin America	131	18.3%	141	19.3%	131	19.1%	148	19.2%	177	18.6%	196	17.8%	190	17.3%	233	14.7%	274	16.6%
South Korea	18	2.5%	18	2.5%	18	2.6%	27	3.6%	43	4.5%	48	4.4%	52	4.8%	87	5.5%	67	4.1%
Singapore	14	2.0%	13	1.8%	10	1.5%	13	1.7%	16	1.7%	19	1.7%	23	2.1%	41	2.6%	38	2.3%
Taiwan	21	2.9%	21	2.9%	19	2.8%	27	3.6%	35	3.7%	42	3.8%	34	3.1%	37	2.3%	58	3.5%
Other Asian NICS	12	1.6%	16	2.2%	16	2.3%	21	2.8%	26	2.8%	32	2.9%	35	3.2%	38	2.4%	50	3.1%
Total Asian NICS	64	9.0%	68	9.3%	63	9.2%	89	11.6%	121	12.7%	141	12.8%	144	13.2%	203	12.8%	213	13.0%
Other Developing Countries	38	5.3%	38	5.2%	32	4.7%	34	4.5%	39	4.1%	49	4.4%	54	4.9%	72	4.5%	56	3.4%
Total Developing Countries	277	38.7%	283	38.7%	250	36.6%	294	38.4%	361	37.9%	416	37.8%	424	38.6%	535	33.7%	581	35.2%
China	1	0.1%	2	0.3%	5	0.7%	5	0.6%	5	0.6%	10	1.0%	14	1.3%	22	1.4%	22	1.3%
USSR	4	0.6%	3	0.5%	4	0.6%	4	0.5%	5	0.5%	3	0.3%	1	0.1%	4	0.3%	4	0.2%
Eastern Europe	2	0.3%	1	0.2%	2	0.3%	2	0.3%	1	0.1%	2	0.2%	1	0.1%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	7	1.0%	7	1.0%	11	1.6%	10	1.3%	11	1.2%	15	1.4%	16	1.5%	27	1.7%	27	1.6%
World	715	100.0%	731	100.0%	685	100.0%	767	100.0%	952	100.0%	1100	100.0%	1097	100.0%	1588	100.0%	1648	100.0%

Source: U.S. Department of Commerce
Standard International Code, Revision 3

TABLE 3.13
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	51	7.9%	62	7.7%	63	7.4%	69	6.4%	80	6.3%	103	7.9%	112	9.9%	156	12.1%	176	12.4%
Japan	122	19.0%	178	22.2%	195	22.8%	272	25.5%	340	26.9%	260	20.0%	154	13.6%	169	13.2%	219	15.5%
United Kingdom	60	9.4%	72	9.0%	73	8.5%	91	8.5%	112	8.8%	138	10.6%	109	9.6%	132	10.3%	146	10.3%
Germany	164	25.5%	195	24.3%	202	23.6%	268	25.1%	331	26.1%	330	25.4%	316	27.9%	359	27.8%	392	27.7%
Netherlands	17	2.6%	22	2.7%	23	2.7%	34	3.2%	35	2.8%	39	3.0%	32	2.8%	32	2.5%	32	2.3%
France	54	8.3%	74	9.2%	68	8.0%	74	6.9%	70	5.5%	75	5.7%	62	5.5%	59	4.6%	61	4.3%
Italy	7	1.1%	11	1.4%	15	1.7%	18	1.7%	18	1.5%	30	2.3%	26	2.3%	19	1.5%	19	1.4%
Other E.C.	49	7.7%	52	6.5%	61	7.2%	68	6.4%	74	5.8%	71	5.4%	70	6.2%	55	4.3%	64	4.5%
Total E.C.	351	54.6%	426	53.1%	442	51.7%	553	51.8%	640	50.5%	683	52.5%	615	54.3%	657	51.0%	714	50.4%
Other Developed	68	10.5%	72	9.0%	74	8.6%	111	10.4%	125	9.8%	126	9.6%	119	10.5%	131	10.2%	122	8.6%
Total Developed	592	92.0%	738	91.9%	774	90.5%	1006	94.1%	1185	93.5%	1172	90.0%	1001	88.3%	1114	86.4%	1231	86.9%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%	4	0.3%	4	0.3%
Total OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%	4	0.3%	4	0.3%
Brazil	6	0.9%	9	1.1%	9	1.1%	6	0.6%	6	0.5%	7	0.6%	3	0.2%	3	0.2%	2	0.2%
Mexico	6	0.9%	25	3.2%	31	3.6%	13	1.3%	20	1.5%	41	3.2%	33	2.9%	39	3.0%	26	1.8%
Other Latin America	25	3.9%	10	1.3%	10	1.2%	11	1.0%	12	1.0%	15	1.1%	19	1.7%	17	1.3%	18	1.3%
Total Latin America	36	5.6%	44	5.5%	50	5.9%	31	2.9%	38	3.0%	63	4.9%	55	4.9%	59	4.6%	46	3.2%
Korea, South	2	0.4%	3	0.4%	5	0.5%	5	0.5%	6	0.5%	8	0.6%	9	0.8%	20	1.5%	22	1.6%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.1%	3	0.3%	6	0.5%	7	0.5%
Taiwan	3	0.5%	5	0.7%	3	0.4%	6	0.5%	8	0.6%	11	0.8%	15	1.3%	22	1.7%	26	1.8%
Other Asian NICS	1	0.1%	1	0.1%	1	0.1%	1	0.1%	2	0.2%	2	0.2%	3	0.3%	3	0.3%	2	0.2%
Total Asian NICS	6	1.0%	10	1.3%	9	1.0%	12	1.1%	16	1.3%	22	1.7%	31	2.7%	51	4.0%	57	4.0%
Other Developing Countries	5	0.7%	7	0.9%	8	0.9%	9	0.9%	17	1.4%	23	1.8%	28	2.4%	37	2.9%	44	3.1%
Total Developing Countries	48	7.4%	61	7.6%	68	7.9%	53	4.9%	72	5.7%	109	8.3%	114	10.0%	148	11.5%	149	10.5%
China	3	0.4%	2	0.3%	4	0.5%	6	0.5%	8	0.6%	13	1.0%	14	1.3%	22	1.7%	27	1.9%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.2%	2	0.2%	9	1.1%	5	0.5%	2	0.2%	8	0.6%	4	0.4%	4	0.3%	9	0.6%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	4	0.6%	4	0.5%	13	1.5%	11	1.0%	10	0.8%	21	1.6%	19	1.7%	26	2.0%	36	2.5%
World	644	100.0%	803	100.0%	855	100.0%	1069	100.0%	1267	100.0%	1302	100.0%	1133	100.0%	1288	100.0%	1416	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.14
TRADE BALANCE (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	113	117	109	87	143	124	118	265	306
Japan	-71	-123	-133	-204	-264	-166	-61	-54	-107
United Kingdom	-20	-37	-43	-57	-69	-80	-40	-29	-56
Germany	-138	-168	-174	-239	-287	-286	-279	-305	-340
Netherlands	19	15	11	10	13	20	12	27	18
France	-38	-61	-56	-55	-47	-52	-46	-40	-32
Italy	4	-1	-6	-9	-5	-17	-13	-3	-2
Other E.C.	-8	-17	-31	-21	-21	9	11	96	66
Total E.C.	-183	-271	-300	-370	-416	-405	-354	-255	-346
Other Developed	-20	-21	-26	-56	-68	-56	-46	-44	-44
Total Developed	-161	-297	-350	-544	-605	-503	-344	-88	-190
Saudi Arabia	30	19	12	11	13	14	14	12	17
Other OPEC	14	38	30	29	38	46	36	27	39
Total OPEC	44	57	42	40	52	60	50	39	56
Brazil	7	1	-1	7	6	7	18	19	32
Mexico	32	19	15	35	38	26	35	59	88
Other Latin America	56	76	66	74	94	100	82	96	108
Total Latin America	94	97	81	117	139	133	135	174	228
South Korea	16	15	13	22	37	40	43	67	45
Singapore	14	13	10	13	16	18	20	34	31
Taiwan	17	16	16	22	27	31	19	15	32
Other Asian NICS	11	15	15	20	24	30	32	35	48
Total Asian NICS	58	58	54	77	105	119	114	151	156
Other Developing Countries	33	31	24	25	22	26	27	35	12
Total Developing Countries	229	222	183	241	289	307	310	387	432
China	-2	0	1	-1	-2	-3	0	0	-5
USSR	4	3	4	4	5	3	1	4	3
Eastern Europe	1	0	-7	-3	-1	-6	-4	-3	-8
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	3	3	-3	0	2	-6	-3	1	-10
World	71	-72	-170	-303	-314	-202	-37	300	232

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.15
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	174	7.8%	174	7.5%	181	7.5%	185	7.0%	212	7.8%	255	7.8%	266	7.3%	450	11.0%	552	12.0%
Japan	504	22.7%	524	22.6%	549	22.7%	576	21.7%	613	22.6%	725	22.2%	785	21.5%	764	18.6%	809	17.6%
United Kingdom	128	5.8%	140	6.1%	136	5.6%	157	5.9%	154	5.7%	185	5.7%	193	5.3%	216	5.3%	229	5.0%
Germany	132	6.0%	174	7.5%	192	7.9%	247	9.3%	264	9.7%	290	8.9%	330	9.0%	319	7.8%	323	7.0%
Netherlands	51	2.3%	58	2.5%	62	2.6%	64	2.4%	69	2.5%	80	2.4%	142	3.9%	191	4.6%	202	4.4%
France	166	7.5%	160	6.9%	143	5.9%	154	5.8%	156	5.7%	204	6.2%	231	6.3%	270	6.6%	287	6.2%
Italy	109	4.9%	108	4.7%	122	5.1%	146	5.5%	155	5.7%	223	6.8%	257	7.0%	276	6.7%	347	7.5%
Other E.C.	102	4.6%	227	9.8%	260	10.8%	305	11.5%	242	8.9%	339	10.4%	420	11.5%	451	11.0%	555	12.0%
Total E.C.	816	36.8%	867	37.4%	916	37.9%	1073	40.3%	1039	38.2%	1320	40.5%	1573	43.0%	1723	42.0%	1943	42.2%
Other Developed	236	10.7%	224	9.7%	239	9.9%	283	10.6%	288	10.6%	314	9.6%	344	9.4%	377	9.2%	390	8.5%
Total Developed	1730	78.0%	1789	77.3%	1885	78.0%	2118	79.6%	2153	79.2%	2614	80.1%	2968	81.1%	3314	80.8%	3694	80.2%
Saudi Arabia	43	2.0%	51	2.2%	48	2.0%	41	1.5%	50	1.8%	54	1.7%	44	1.2%	44	1.1%	47	1.0%
Other OPEC	75	3.4%	71	3.1%	72	3.0%	72	2.7%	71	2.6%	79	2.4%	51	1.4%	50	1.2%	61	1.3%
Total OPEC	119	5.3%	122	5.3%	119	4.9%	113	4.2%	120	4.4%	133	4.1%	96	2.6%	93	2.3%	108	2.3%
Brazil	32	1.4%	22	1.0%	22	0.9%	38	1.4%	36	1.3%	32	1.0%	52	1.4%	54	1.3%	73	1.6%
Mexico	30	1.3%	38	1.6%	46	1.9%	47	1.8%	48	1.8%	57	1.7%	73	2.0%	105	2.6%	120	2.6%
Other Latin America	187	8.5%	195	8.4%	196	8.1%	208	7.8%	202	7.4%	210	6.4%	185	5.1%	197	4.8%	225	4.9%
Total Latin America	249	11.2%	255	11.0%	264	10.9%	293	11.0%	286	10.5%	299	9.2%	310	8.5%	357	8.7%	418	9.1%
South Korea	22	1.0%	22	1.0%	26	1.1%	24	0.9%	29	1.1%	41	1.2%	43	1.2%	53	1.3%	64	1.4%
Singapore	7	0.3%	6	0.3%	6	0.3%	8	0.3%	10	0.4%	12	0.4%	16	0.4%	13	0.3%	13	0.3%
Taiwan	19	0.9%	25	1.1%	26	1.1%	32	1.2%	33	1.2%	45	1.4%	42	1.2%	50	1.2%	60	1.3%
Other Asian NICS	21	1.0%	26	1.1%	26	1.1%	26	1.0%	33	1.2%	39	1.2%	39	1.1%	56	1.4%	49	1.1%
Total Asian NICS	69	3.1%	78	3.4%	84	3.5%	90	3.4%	105	3.8%	137	4.2%	140	3.8%	171	4.2%	186	4.0%
Other Developing Countries	79	3.6%	105	4.5%	105	4.4%	89	3.3%	87	3.2%	124	3.8%	143	3.9%	152	3.7%	166	3.6%
Total Developing Countries	480	21.6%	517	22.3%	521	21.6%	533	20.0%	541	19.9%	634	19.4%	663	18.1%	743	18.1%	837	18.2%
China	1	0.1%	1	0.1%	2	0.1%	3	0.1%	18	0.6%	6	0.2%	8	0.2%	14	0.3%	15	0.3%
USSR	1	0.0%	1	0.1%	1	0.0%	1	0.0%	1	0.0%	2	0.1%	13	0.3%	25	0.6%	47	1.0%
Eastern Europe	5	0.2%	6	0.3%	8	0.3%	7	0.2%	6	0.2%	5	0.2%	8	0.2%	6	0.2%	13	0.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	8	0.3%	9	0.4%	11	0.5%	11	0.4%	24	0.9%	14	0.4%	29	0.8%	46	1.1%	76	1.6%
World	2217	100.0%	2316	100.0%	2418	100.0%	2662	100.0%	2718	100.0%	3262	100.0%	3660	100.0%	4103	100.0%	4606	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code

TABLE 3.16
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	16	1.9%	21	2.0%	26	2.3%	24	1.9%	32	2.1%	45	2.4%	72	3.4%	101	4.0%	118	3.9%
Japan	112	13.8%	104	10.0%	115	10.2%	163	13.2%	174	11.6%	195	10.5%	213	10.2%	213	8.5%	270	8.8%
United Kingdom	134	16.5%	232	22.4%	201	17.8%	207	16.8%	238	15.8%	349	18.9%	367	17.6%	457	18.3%	588	19.3%
Germany	132	16.3%	136	13.2%	151	13.4%	190	15.4%	270	17.9%	293	15.8%	304	14.6%	337	13.5%	404	13.2%
Netherlands	25	3.0%	27	2.6%	39	3.5%	37	3.0%	33	2.2%	28	1.5%	39	1.9%	37	1.5%	38	1.2%
France	50	6.2%	50	4.8%	52	4.6%	65	5.3%	74	4.9%	78	4.2%	88	4.2%	113	4.5%	129	4.2%
Italy	84	10.4%	110	10.6%	127	11.2%	108	8.8%	173	11.5%	188	10.1%	157	7.5%	183	7.3%	216	7.1%
Other E.C.	72	8.8%	132	12.7%	88	7.8%	84	6.9%	134	8.9%	191	10.3%	268	12.9%	334	13.3%	397	13.0%
Total E.C.	497	61.2%	687	66.3%	658	58.3%	691	56.1%	922	61.1%	1127	61.0%	1223	58.6%	1461	58.4%	1772	58.0%
Other Developed	109	13.5%	140	13.6%	244	21.6%	254	20.6%	275	18.2%	352	19.0%	460	22.1%	581	23.2%	678	22.2%
Total Developed	734	90.4%	952	91.9%	1043	92.4%	1132	91.9%	1403	93.0%	1719	93.0%	1968	94.4%	2356	94.2%	2838	93.0%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%	3	0.1%	4	0.1%
Total OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%	3	0.1%	4	0.1%
Brazil	8	0.9%	5	0.5%	7	0.6%	6	0.5%	8	0.5%	9	0.5%	6	0.3%	8	0.3%	8	0.3%
Mexico	12	1.5%	12	1.2%	12	1.0%	19	1.5%	23	1.5%	22	1.2%	17	0.8%	15	0.6%	18	0.6%
Other Latin America	24	2.9%	26	2.5%	22	2.0%	26	2.1%	23	1.5%	30	1.6%	11	0.5%	15	0.6%	21	0.7%
Total Latin America	44	5.4%	44	4.3%	41	3.6%	51	4.1%	53	3.5%	62	3.3%	33	1.6%	37	1.5%	48	1.6%
South Korea	2	0.2%	2	0.2%	3	0.3%	3	0.2%	3	0.2%	2	0.1%	2	0.1%	3	0.1%	2	0.1%
Singapore	0	0.0%	5	0.4%	1	0.1%	1	0.1%	3	0.2%	9	0.5%	3	0.1%	9	0.3%	27	0.9%
Taiwan	0	0.1%	2	0.1%	2	0.1%	1	0.1%	2	0.1%	2	0.1%	3	0.1%	4	0.2%	4	0.1%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	2	0.2%	2	0.1%	2	0.1%	2	0.1%	8	0.3%	6	0.2%
Total Asian NICS	3	0.3%	10	0.9%	6	0.5%	7	0.6%	10	0.6%	16	0.9%	9	0.4%	24	1.0%	39	1.3%
Other Developing Countries	4	0.5%	5	0.5%	9	0.8%	8	0.7%	9	0.6%	18	1.0%	13	0.6%	21	0.8%	32	1.1%
Total Developing Countries	52	6.4%	61	5.9%	58	5.2%	69	5.6%	74	4.9%	97	5.3%	57	2.7%	84	3.4%	122	4.0%
China	21	2.6%	17	1.7%	21	1.9%	21	1.7%	25	1.6%	26	1.4%	50	2.4%	47	1.9%	78	2.6%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	5	0.6%	5	0.5%	7	0.6%	9	0.7%	7	0.5%	7	0.4%	10	0.5%	13	0.5%	14	0.5%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total-CPE	26	3.2%	22	2.2%	28	2.5%	30	2.5%	32	2.1%	33	1.8%	60	2.9%	60	2.4%	93	3.0%
World	812	100.0%	1036	100.0%	1129	100.0%	1231	100.0%	1509	100.0%	1849	100.0%	2086	100.0%	2500	100.0%	3053	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.17
TRADE BALANCE (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	158	153	155	162	181	210	194	349	434
Japan	392	420	434	413	439	530	572	551	539
United Kingdom	-6	-92	-65	-50	-84	-164	-174	-241	-359
Germany	0	37	40	57	-6	-3	26	-18	-81
Netherlands	27	31	23	27	36	52	103	154	164
France	116	109	92	89	82	125	142	156	158
Italy	24	-1	-5	38	-17	35	100	93	131
Other E.C.	31	96	172	221	107	148	152	117	158
Total E.C.	319	180	257	382	117	193	350	263	171
Other Developed	127	84	-4	30	13	-38	-116	-204	-288
Total Developed	996	838	842	987	749	895	999	958	857
Saudi Arabia	43	51	48	41	50	54	44	44	47
Other OPEC	74	68	69	69	68	77	49	47	56
Total OPEC*	117	120	117	110	117	131	93	91	104
Brazil	25	17	14	32	28	23	46	47	65
Mexico	18	25	35	28	25	35	57	90	102
Other Latin America	163	169	173	182	180	180	174	183	204
Total Latin America	206	211	223	242	233	237	277	320	370
South Korea	20	20	23	21	26	38	41	49	62
Singapore	6	1	6	7	6	3	14	4	-14
Taiwan	19	23	24	31	31	43	39	46	56
Other Asian NICS	21	25	25	23	31	37	37	48	43
Total Asian NICS	66	69	78	83	95	121	131	147	147
Other Developing Countries	75	100	97	81	79	107	130	131	134
Total Developing Countries	428	456	463	464	467	537	606	659	714
China	-19	-16	-19	-18	-7	-19	-42	-33	-63
USSR	1	1	1	1	1	2	13	25	47
Eastern Europe	0	1	2	-2	-1	-2	-3	-7	-1
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	-18	-13	-16	-20	-8	-19	-32	-15	-17
World	1405	1280	1288	1431	1209	1413	1574	1603	1553

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.18
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	118	14.8%	116	14.3%	103	13.3%	105	13.0%	140	14.7%	165	14.6%	215	14.7%	401	20.5%	521	22.1%
Japan	58	7.2%	74	9.2%	71	9.2%	78	9.7%	125	13.1%	111	9.9%	163	11.1%	249	12.7%	284	12.0%
United Kingdom	58	7.3%	60	7.4%	66	8.6%	65	8.0%	73	7.6%	101	9.0%	123	8.4%	127	6.5%	143	6.1%
Germany	34	4.3%	25	3.0%	24	3.1%	25	3.1%	30	3.2%	40	3.5%	45	3.1%	71	3.6%	89	3.7%
Netherlands	24	3.1%	24	3.0%	24	3.1%	29	3.6%	34	3.5%	43	3.8%	43	2.9%	49	2.5%	67	2.8%
France	23	2.8%	25	3.1%	30	3.9%	24	2.9%	29	3.1%	41	3.7%	48	3.3%	59	3.0%	60	2.5%
Italy	8	1.0%	7	0.8%	8	1.0%	9	1.1%	10	1.0%	17	1.5%	23	1.6%	26	1.3%	37	1.6%
Other E.C.	36	4.5%	30	3.6%	34	4.4%	32	4.0%	34	3.6%	43	3.9%	59	4.0%	78	4.0%	113	4.8%
Total E.C.	183	23.0%	171	21.0%	186	24.1%	185	22.8%	210	22.0%	286	25.4%	341	23.2%	410	20.9%	508	21.5%
Other Developed	65	8.2%	71	8.7%	67	8.6%	74	9.2%	80	8.4%	89	7.9%	116	7.9%	128	6.5%	141	6.0%
Total Developed	423	53.2%	432	53.2%	426	55.2%	442	54.7%	553	58.1%	651	57.8%	835	56.9%	1189	60.6%	1454	61.6%
Saudi Arabia	39	4.9%	31	3.8%	28	3.7%	20	2.5%	24	2.6%	21	1.9%	23	1.6%	33	1.7%	35	1.5%
Other OPEC	54	6.8%	55	6.8%	48	6.3%	42	5.2%	53	5.6%	66	5.9%	64	4.3%	76	3.9%	89	3.8%
Total OPEC	93	11.7%	86	10.6%	77	9.9%	62	7.7%	77	8.1%	87	7.7%	87	5.9%	109	5.6%	124	5.2%
Brazil	10	1.2%	7	0.8%	7	0.9%	9	1.2%	9	0.9%	10	0.9%	16	1.1%	16	0.8%	21	0.9%
Mexico	18	2.2%	21	2.6%	25	3.2%	26	3.2%	26	2.7%	35	3.1%	83	5.6%	125	6.4%	112	4.8%
Other Latin America	162	20.4%	165	20.3%	143	18.5%	153	18.9%	166	17.5%	184	16.4%	222	15.1%	237	12.1%	264	11.2%
Total Latin America	190	23.8%	193	23.7%	175	22.7%	189	23.3%	201	21.1%	230	20.4%	320	21.8%	377	19.2%	397	16.8%
South Korea	11	1.4%	14	1.7%	12	1.5%	16	1.9%	19	2.0%	29	2.5%	40	2.7%	51	2.6%	71	3.0%
Singapore	13	1.7%	15	1.8%	13	1.7%	15	1.8%	16	1.7%	20	1.7%	31	2.1%	33	1.7%	60	2.6%
Taiwan	11	1.3%	16	2.0%	12	1.6%	21	2.5%	19	2.0%	26	2.3%	36	2.4%	53	2.7%	71	3.0%
Other Asian NICS	28	3.6%	33	4.1%	32	4.1%	35	4.3%	38	4.0%	43	3.8%	50	3.4%	61	3.1%	74	3.1%
Total Asian NICS	64	8.0%	78	9.6%	69	8.9%	86	10.6%	93	9.8%	118	10.4%	157	10.7%	197	10.0%	276	11.7%
Other Developing Countries	49	6.2%	47	5.8%	44	5.7%	46	5.7%	50	5.2%	61	5.4%	77	5.3%	95	4.8%	112	4.8%
Total Developing Countries	370	46.5%	378	46.4%	342	44.3%	361	44.6%	394	41.5%	469	41.7%	620	42.2%	751	38.3%	872	36.9%
China	0	0.0%	1	0.1%	1	0.2%	2	0.3%	3	0.3%	5	0.4%	7	0.5%	12	0.6%	14	0.6%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.3%	6	0.3%	5	0.2%
Eastern Europe	2	0.2%	2	0.3%	2	0.3%	3	0.4%	1	0.1%	1	0.1%	2	0.1%	4	0.2%	16	0.7%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	2	0.3%	3	0.4%	4	0.5%	6	0.7%	4	0.4%	6	0.5%	13	0.9%	22	1.1%	36	1.5%
World	795	100.0%	813	100.0%	772	100.0%	809	100.0%	951	100.0%	1126	100.0%	1469	100.0%	1963	100.0%	2361	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.19
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	34	7.5%	41	6.5%	66	9.0%	81	9.2%	80	8.1%	95	8.1%	133	11.5%	168	12.7%	190	13.4%
Japan	23	5.0%	30	4.8%	34	4.6%	45	5.1%	56	5.7%	74	6.3%	65	5.6%	65	4.9%	67	4.7%
United Kingdom	31	6.8%	41	6.6%	61	8.2%	67	7.6%	66	6.7%	84	7.2%	56	4.8%	72	5.5%	90	6.3%
Germany	43	9.6%	64	10.1%	67	9.1%	82	9.3%	92	9.4%	103	8.8%	79	6.8%	103	7.8%	100	7.1%
Netherlands	9	2.0%	9	1.4%	14	1.8%	22	2.5%	18	1.9%	24	2.0%	17	1.4%	14	1.1%	18	1.3%
France	157	34.8%	233	37.1%	250	34.0%	278	31.7%	328	33.4%	420	35.7%	448	38.5%	496	37.5%	509	35.9%
Italy	10	2.2%	18	2.9%	22	3.0%	29	3.3%	38	3.9%	38	3.2%	33	2.9%	42	3.1%	45	3.2%
Other E.C.	23	5.1%	33	5.3%	38	5.1%	38	4.3%	55	5.5%	49	4.2%	50	4.3%	51	3.8%	54	3.8%
Total E.C.	273	60.5%	399	63.4%	451	61.2%	515	58.8%	598	60.9%	718	61.1%	682	58.6%	778	58.8%	817	57.6%
Other Developed	26	5.8%	42	6.6%	44	5.9%	62	7.0%	62	6.3%	74	6.3%	70	6.0%	83	6.3%	82	5.8%
Total Developed	355	78.7%	511	81.3%	595	80.7%	703	80.2%	796	81.0%	960	81.7%	951	81.7%	1094	82.6%	1156	81.5%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%	25	1.9%	16	1.1%
Total OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%	26	1.9%	16	1.1%
Brazil	8	1.8%	13	2.0%	16	2.2%	14	1.6%	15	1.6%	24	2.0%	32	2.8%	22	1.6%	21	1.5%
Mexico	17	3.7%	18	2.9%	17	2.3%	22	2.5%	33	3.4%	37	3.2%	39	3.3%	44	3.4%	52	3.7%
Other Latin America	25	5.4%	25	4.0%	32	4.3%	39	4.4%	32	3.2%	36	3.1%	36	3.1%	47	3.6%	44	3.1%
Total Latin America	50	11.0%	56	8.9%	65	8.8%	75	8.5%	80	8.2%	97	8.3%	107	9.2%	114	8.6%	117	8.3%
South Korea	1	0.3%	2	0.3%	3	0.4%	6	0.7%	6	0.6%	6	0.5%	6	0.6%	8	0.6%	9	0.6%
Singapore	2	0.5%	2	0.4%	3	0.4%	5	0.6%	8	0.8%	8	0.7%	6	0.5%	5	0.4%	4	0.3%
Taiwan	2	0.5%	4	0.7%	13	1.8%	29	3.4%	30	3.1%	29	2.4%	30	2.6%	27	2.0%	45	3.2%
Other Asian NICS	1	0.3%	3	0.5%	3	0.5%	3	0.4%	4	0.4%	5	0.4%	8	0.7%	7	0.6%	6	0.4%
Total Asian NICS	7	1.6%	12	1.9%	22	3.0%	43	5.0%	48	4.9%	48	4.0%	50	4.3%	47	3.6%	63	4.4%
Other Developing Countries	11	2.5%	20	3.2%	28	3.8%	24	2.8%	26	2.7%	27	2.3%	25	2.1%	33	2.5%	43	3.0%
Total Developing Countries	80	17.8%	101	16.1%	126	17.1%	156	17.8%	169	17.2%	191	16.2%	193	16.6%	205	15.5%	232	16.4%
China	15	3.3%	15	2.4%	15	2.0%	16	1.8%	16	1.6%	24	2.1%	20	1.7%	23	1.7%	27	1.9%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.3%	1	0.2%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%	1	0.1%	2	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	16	3.6%	17	2.7%	16	2.1%	17	1.9%	17	1.7%	25	2.1%	21	1.8%	24	1.8%	30	2.1%
World	452	100.0%	629	100.0%	737	100.0%	876	100.0%	982	100.0%	1175	100.0%	1165	100.0%	1323	100.0%	1417	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.20
TRADE BALANCE (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	84	76	36	24	60	70	82	234	331
Japan	35	44	37	33	68	37	97	184	217
United Kingdom	28	19	6	-2	7	17	67	55	53
Germany	-9	-39	-43	-57	-62	-63	-34	-32	-12
Netherlands	15	15	10	7	16	20	26	35	49
France	-135	-208	-220	-254	-299	-378	-400	-437	-449
Italy	-2	-11	-14	-20	-29	-21	-10	-16	-8
Other E.C.	12	-4	-4	-6	-20	-6	10	27	58
Total E.C.	-90	-228	-265	-331	-388	-432	-341	-367	-309
Other Developed	39	29	23	13	18	15	46	45	59
Total Developed	68	-79	-169	-260	-243	-309	-116	95	298
Saudi Arabia	39	31	28	20	24	21	23	33	34
Other OPEC	42	42	34	18	33	43	49	51	74
Total OPEC	80	72	62	38	58	64	72	83	108
Brazil	2	-6	-9	-4	-7	-14	-16	-6	0
Mexico	1	3	8	4	-7	-2	44	81	60
Other Latin America	137	140	111	114	134	148	186	189	219
Total Latin America	140	137	110	114	120	132	213	264	279
South Korea	10	12	9	10	13	22	33	43	62
Singapore	11	12	10	10	9	12	25	28	57
Taiwan	9	12	-1	-9	-11	-2	6	26	26
Other Asian NICS	27	30	28	32	34	38	43	54	68
Total Asian NICS	57	67	47	42	45	70	107	150	213
Other Developing Countries	38	27	16	22	23	34	53	62	69
Total Developing Countries	290	277	216	205	225	278	427	546	639
China	-15	-15	-13	-13	-13	-20	-13	-11	-13
USSR	0	0	0	0	0	0	4	6	5
Eastern Europe	1	1	1	2	0	0	1	2	14
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	-14	-14	-12	-11	-13	-19	-8	-2	6
World	344	183	35	-67	-31	-50	304	639	944

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.21
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	119	8.9%	200	9.1%	171	9.8%	106	11.5%	110	10.2%	115	9.6%	245	8.7%	188	7.3%	197	9.4%
Japan	103	7.7%	156	7.1%	108	6.2%	48	5.1%	73	6.8%	79	6.6%	151	5.3%	160	6.2%	165	7.9%
United Kingdom	1	0.1%	1	0.0%	1	0.0%	1	0.1%	2	0.2%	1	0.0%	5	0.2%	5	0.2%	7	0.3%
Germany	24	1.8%	34	1.5%	30	1.7%	22	2.3%	20	1.8%	12	1.0%	41	1.4%	37	1.4%	27	1.3%
Netherlands	0	0.0%	19	0.8%	19	1.1%	9	0.9%	10	0.9%	12	1.0%	37	1.3%	35	1.4%	25	1.2%
France	15	1.1%	23	1.1%	28	1.6%	19	2.0%	45	4.1%	39	3.3%	70	2.5%	57	2.2%	56	2.7%
Italy	34	2.5%	56	2.5%	36	2.0%	23	2.5%	35	3.2%	22	1.9%	33	1.2%	15	0.6%	14	0.6%
Other EC	158	11.8%	178	8.1%	108	6.2%	60	6.5%	103	9.5%	67	5.6%	171	6.1%	121	4.7%	103	4.9%
Total EC	232	17.4%	310	14.1%	222	12.7%	133	14.3%	214	19.7%	154	12.8%	357	12.6%	270	10.5%	231	11.0%
Other Developed	120	9.0%	164	7.4%	139	7.9%	68	7.3%	91	8.4%	77	6.4%	214	7.6%	240	9.3%	221	10.6%
Total Developed	573	43.0%	830	37.7%	640	36.6%	356	38.3%	488	45.0%	425	35.5%	967	34.3%	857	33.3%	814	38.9%
Saudi Arabia	2	0.2%	4	0.2%	1	0.1%	5	0.5%	8	0.8%	8	0.7%	5	0.2%	15	0.6%	17	0.8%
Other OPEC	33	2.5%	64	2.9%	33	1.9%	20	2.1%	50	4.6%	54	4.5%	97	3.4%	103	4.0%	44	2.1%
Total OPEC	36	2.7%	68	3.1%	35	2.0%	25	2.7%	58	5.4%	62	5.1%	102	3.6%	119	4.6%	61	2.9%
Brazil	19	1.4%	87	3.9%	45	2.6%	75	8.1%	51	4.7%	47	3.9%	52	1.8%	71	2.8%	104	5.0%
Mexico	51	3.8%	82	3.7%	55	3.1%	24	2.6%	24	2.3%	13	1.1%	55	1.9%	44	1.7%	49	2.4%
Other Latin America	156	11.7%	204	9.3%	184	10.5%	102	11.0%	120	11.1%	138	11.5%	287	10.2%	243	9.4%	265	12.7%
Total Latin America	226	17.0%	373	16.9%	284	16.2%	201	21.6%	195	18.0%	197	16.5%	394	14.0%	358	13.9%	419	20.0%
South Korea	3	0.2%	48	2.2%	46	2.6%	29	3.1%	31	2.9%	34	2.9%	62	2.2%	82	3.2%	75	3.6%
Singapore	13	1.0%	5	0.2%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%
Taiwan	60	4.5%	116	5.3%	24	1.4%	1	0.1%	3	0.3%	1	0.1%	2	0.1%	2	0.1%	4	0.2%
Other Asian NICS	0	0.0%	6	0.3%	22	1.3%	0	0.0%	1	0.1%	2	0.2%	7	0.3%	5	0.2%	1	0.0%
Total Asian NICS	76	5.7%	176	8.0%	93	5.3%	32	3.4%	37	3.4%	38	3.2%	71	2.5%	90	3.5%	80	3.8%
Other Developing Countries	179	13.5%	410	18.6%	442	25.3%	137	14.8%	77	7.1%	199	16.6%	595	21.1%	435	16.9%	531	25.4%
Total Developing Countries	504	37.9%	1001	45.4%	835	47.7%	379	40.8%	337	31.1%	475	39.6%	1099	38.9%	960	37.3%	1058	50.6%
China	168	12.6%	267	12.1%	139	8.0%	46	5.0%	130	12.0%	182	15.2%	487	17.3%	544	21.1%	982	47.0%
USSR	58	4.3%	47	2.1%	100	5.7%	126	13.5%	110	10.1%	107	8.9%	237	8.4%	201	7.8%	124	5.9%
Eastern Europe	29	2.2%	58	2.6%	36	2.1%	23	2.4%	20	1.8%	10	0.8%	31	1.1%	12	0.5%	2	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	254	19.1%	372	16.9%	276	15.8%	194	20.9%	259	23.9%	298	24.9%	755	26.8%	757	29.4%	1108	53.0%
World	1332	100.0%	2203	100.0%	1750	100.0%	929	100.0%	1084	100.0%	1199	100.0%	2821	100.0%	2575	100.0%	2090	100.0%

Source: U.S. Department of Commerce
Standard International Code, Revision 3

TABLE 3.22
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	735	75.2%	831	74.5%	666	70.5%	569	68.0%	579	75.4%	715	72.2%	708	70.9%	751	78.6%	723	78.6%
Japan	4	0.4%	5	0.4%	5	0.6%	3	0.3%	3	0.4%	4	0.4%	10	1.0%	7	0.7%	7	0.8%
United Kingdom	1	0.1%	1	0.1%	1	0.1%	1	0.1%	3	0.4%	4	0.4%	3	0.3%	1	0.1%	1	0.1%
Germany	15	1.6%	20	1.8%	18	1.9%	17	2.1%	19	2.4%	32	3.2%	18	1.8%	22	2.3%	30	3.3%
Netherlands	44	4.5%	34	3.0%	53	5.6%	39	4.7%	27	3.5%	27	2.8%	33	3.3%	26	2.7%	20	2.1%
France	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.4%	2	0.2%	3	0.3%	3	0.4%
Italy	0	0.0%	6	0.5%	7	0.7%	10	1.2%	6	0.8%	13	1.3%	6	0.6%	6	0.7%	0	0.0%
Other E.C.	11	1.2%	16	1.4%	12	1.2%	8	1.0%	6	0.7%	11	1.1%	8	0.8%	10	1.1%	7	0.8%
Total E.C.	72	7.4%	77	6.9%	91	9.6%	76	9.1%	60	7.9%	91	9.2%	70	7.0%	68	7.1%	62	6.7%
Other Developed	11	1.1%	14	1.2%	21	2.3%	13	1.6%	17	2.2%	21	2.2%	26	2.6%	20	2.1%	28	3.0%
Total Developed	822	84.1%	926	83.1%	784	82.9%	661	79.0%	660	85.9%	832	83.9%	814	81.5%	846	88.5%	820	89.2%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	4	0.5%	0	0.0%	0	0.0%	2	0.2%	3	0.3%	3	0.4%
Other OPEC	24	2.5%	11	1.0%	10	1.1%	14	1.7%	25	3.2%	25	2.5%	39	3.9%	11	1.2%	4	0.5%
Total OPEC	24	2.5%	11	1.0%	10	1.1%	18	2.2%	25	3.2%	25	2.5%	41	4.1%	15	1.5%	8	0.9%
Brazil	5	0.5%	0	0.0%	1	0.1%	0	0.0%	0	0.1%	0	0.0%	5	0.5%	2	0.2%	0	0.0%
Mexico	8	0.8%	4	0.4%	1	0.1%	3	0.3%	6	0.7%	3	0.3%	10	1.0%	15	1.5%	15	1.6%
Other Latin America	24	2.4%	14	1.3%	10	1.1%	17	2.1%	25	3.3%	45	4.5%	32	3.2%	34	3.5%	29	3.2%
Total Latin America	37	3.7%	19	1.7%	12	1.3%	20	2.4%	32	4.1%	48	4.9%	47	4.8%	50	5.3%	44	4.8%
South Korea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Taiwan	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Developing Countries	43	4.4%	39	3.5%	32	3.4%	21	2.6%	30	3.9%	47	4.8%	44	4.4%	30	3.2%	21	2.3%
Total Developing Countries	89	9.1%	60	5.3%	54	5.7%	55	6.6%	80	10.4%	106	10.7%	123	12.3%	86	9.0%	71	7.7%
China	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	2	0.2%	0	0.0%	0	0.0%
USSR	43	4.4%	54	4.8%	57	6.0%	60	7.1%	11	1.4%	24	2.4%	9	0.9%	1	0.2%	17	1.8%
Eastern Europe	24	2.5%	75	6.7%	50	5.3%	61	7.3%	17	2.2%	29	2.9%	52	5.2%	22	2.3%	12	1.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	67	6.9%	129	11.5%	108	11.4%	120	14.4%	28	3.7%	53	5.4%	62	6.3%	24	2.5%	29	3.1%
World	977	100.0%	1115	100.0%	945	100.0%	837	100.0%	768	100.0%	991	100.0%	999	100.0%	955	100.0%	919	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.23
TRADE BALANCE (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	-616	-631	-495	-463	-469	-600	-463	-563	-526
Japan	99	151	103	45	70	76	141	153	158
United Kingdom	0	0	-1	-1	-1	-4	2	4	6
Germany	9	13	12	4	1	-19	23	15	-4
Netherlands	-44	-15	-34	-30	-17	-15	4	9	5
France	15	23	28	19	45	36	68	53	53
Italy	34	50	29	13	28	9	27	9	13
Other E.C.	146	163	96	52	97	56	163	111	96
Total E.C.	160	233	131	57	154	62	287	202	169
Other Developed	109	150	117	55	74	56	188	220	193
Total Developed	-248	-96	-144	-306	-171	-406	153	12	-6
Saudi Arabia	2	4	1	1	8	8	4	12	13
Other OPEC	9	53	23	6	25	29	57	92	39
Total OPEC	11	58	25	6	34	37	61	104	53
Brazil	13	86	45	75	50	46	47	69	104
Mexico	44	78	54	22	19	10	45	29	34
Other Latin America	133	190	173	85	95	93	255	209	236
Total Latin America	190	354	272	181	164	149	347	308	374
South Korea	3	48	46	29	31	34	61	81	75
Singapore	13	5	0	2	0	0	0	1	0
Taiwan	60	116	24	1	3	1	2	2	4
Other Asian NICS	0	6	22	0	1	2	7	5	0
Total Asian NICS	76	176	93	32	37	38	71	89	80
Other Developing Countries	136	371	411	116	47	151	551	404	509
Total Developing Countries	416	942	781	324	257	369	976	874	988
China	168	267	139	46	129	182	486	544	982
USSR	15	-7	43	66	99	83	228	200	107
Eastern Europe	5	-17	-14	-38	3	-19	-21	-10	-9
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	187	243	168	74	231	245	693	733	1079
World	355	1089	805	92	317	208	1822	1619	1171

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.24
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	381	13.9%	394	13.5%	374	13.7%	387	12.4%	552	13.7%	625	11.4%	704	12.3%	1175	18.3%	1267	16.8%
Japan	252	9.2%	276	9.4%	223	8.2%	234	7.5%	294	7.3%	397	7.2%	443	7.7%	447	7.0%	517	6.9%
United Kingdom	120	4.4%	134	4.6%	113	4.1%	122	3.9%	149	3.7%	172	3.1%	230	4.0%	256	4.0%	125	1.7%
Germany	61	2.2%	66	2.3%	88	3.2%	110	3.5%	110	2.7%	138	2.5%	180	3.1%	204	3.2%	221	2.9%
Netherlands	137	5.0%	196	6.7%	198	7.3%	196	6.3%	207	5.1%	311	5.7%	370	6.5%	478	7.4%	521	6.9%
France	36	1.3%	31	1.1%	34	1.2%	40	1.3%	46	1.1%	55	1.0%	81	1.4%	83	1.3%	74	1.0%
Italy	20	0.7%	30	1.0%	29	1.1%	34	1.1%	49	1.2%	62	1.1%	74	1.3%	55	0.9%	63	0.8%
Other E.C.	213	7.8%	232	7.9%	229	8.4%	261	8.4%	300	7.4%	388	7.0%	462	8.1%	526	8.2%	704	9.3%
Total E.C.	588	21.5%	689	23.6%	691	25.3%	763	24.4%	861	21.4%	1125	20.4%	1397	24.4%	1603	24.9%	1708	22.7%
Other Developed	158	5.8%	158	5.4%	155	5.7%	163	5.2%	219	5.4%	287	5.2%	347	6.1%	308	4.8%	354	4.7%
Total Developed	1379	50.4%	1517	51.9%	1443	52.9%	1547	49.6%	1927	47.8%	2434	44.2%	2891	50.5%	3533	55.0%	3845	51.0%
Saudi Arabia	40	1.4%	37	1.3%	30	1.1%	20	0.7%	19	0.5%	30	0.5%	21	0.4%	22	0.3%	42	0.6%
Other OPEC	181	6.6%	185	6.3%	156	5.7%	214	6.9%	230	5.7%	276	5.0%	244	4.3%	246	3.8%	354	4.7%
Total OPEC	220	8.0%	222	7.6%	186	6.8%	235	7.5%	249	6.2%	306	5.6%	265	4.6%	269	4.2%	396	5.3%
Brazil	49	1.8%	40	1.4%	44	1.6%	55	1.8%	53	1.3%	59	1.1%	99	1.7%	84	1.3%	116	1.5%
Mexico	230	8.4%	209	7.1%	250	9.2%	264	8.5%	296	7.3%	409	7.4%	542	9.5%	533	8.3%	600	8.0%
Other Latin America	289	10.6%	314	10.7%	269	9.9%	346	11.1%	466	11.6%	580	10.5%	503	8.8%	534	8.3%	687	9.1%
Total Latin America	569	20.8%	563	19.2%	564	20.6%	665	21.3%	815	20.2%	1049	19.1%	1145	20.0%	1151	17.9%	1404	18.6%
South Korea	95	3.5%	102	3.5%	80	2.9%	121	3.9%	183	4.5%	212	3.8%	242	4.2%	264	4.1%	312	4.1%
Singapore	55	2.0%	44	1.5%	27	1.0%	42	1.4%	67	1.7%	99	1.8%	141	2.5%	143	2.2%	201	2.7%
Taiwan	97	3.5%	93	3.2%	67	2.4%	119	3.8%	210	5.2%	282	5.1%	284	5.0%	255	4.0%	360	4.8%
Other Asian NICS	87	3.2%	94	3.2%	82	3.0%	146	4.7%	238	5.9%	432	7.9%	316	5.5%	360	5.6%	463	6.1%
Total Asian NICS	333	12.2%	332	11.3%	256	9.4%	428	13.7%	698	17.3%	1025	18.6%	983	17.2%	1022	15.9%	1335	17.7%
Other Developing Countries	199	7.3%	141	4.8%	124	4.5%	150	4.8%	219	5.4%	275	5.0%	326	5.7%	398	6.2%	421	5.6%
Total Developing Countries	1262	46.1%	1171	40.0%	1056	38.7%	1380	44.2%	1863	46.2%	2488	45.2%	2620	45.8%	2729	42.5%	3372	44.7%
China	92	3.4%	234	8.0%	226	8.3%	191	6.1%	239	5.9%	575	10.5%	197	3.4%	151	2.4%	268	3.6%
USSR	3	0.1%	4	0.1%	3	0.1%	2	0.1%	1	0.0%	1	0.0%	10	0.2%	13	0.2%	48	0.6%
Eastern Europe	1	0.0%	1	0.0%	2	0.1%	1	0.0%	2	0.1%	4	0.1%	8	0.1%	2	0.0%	4	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	96	3.5%	238	8.1%	231	8.5%	194	6.2%	243	6.0%	581	10.6%	215	3.8%	166	2.6%	320	4.2%
World	2737	100.0%	2926	100.0%	2730	100.0%	3121	100.0%	4033	100.0%	5503	100.0%	5727	100.0%	6429	100.0%	7537	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.25
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	90	16.6%	143	18.4%	185	21.5%	228	22.6%	281	25.3%	445	32.4%	496	29.4%	610	30.9%	609	31.6%
Japan	142	26.2%	179	23.1%	185	21.5%	190	18.9%	219	19.7%	219	15.9%	305	18.0%	315	16.0%	320	16.6%
United Kingdom	35	6.5%	51	6.5%	61	7.1%	89	8.8%	86	7.7%	105	7.6%	138	8.2%	130	6.6%	114	5.9%
Germany	95	17.6%	119	15.3%	122	14.2%	149	14.8%	174	15.6%	186	13.5%	232	13.7%	243	12.3%	270	14.0%
Netherlands	18	3.3%	29	3.8%	43	5.0%	42	4.1%	43	3.9%	52	3.8%	61	3.6%	73	3.7%	73	3.8%
France	39	7.3%	50	6.4%	68	7.8%	69	6.9%	63	5.7%	70	5.1%	86	5.1%	94	4.8%	98	5.1%
Italy	14	2.6%	19	2.4%	22	2.6%	26	2.6%	27	2.5%	26	1.9%	46	2.7%	63	3.2%	69	3.6%
Other E.C.	15	2.9%	26	3.4%	28	3.3%	34	3.4%	36	3.3%	37	2.7%	78	4.6%	80	4.0%	69	3.6%
Total E.C.	217	40.1%	294	37.8%	344	40.0%	409	40.7%	429	38.5%	476	34.6%	640	37.9%	683	34.6%	693	35.9%
Other Developed	14	2.6%	21	2.7%	26	3.0%	29	2.9%	32	2.8%	37	2.7%	60	3.6%	74	3.7%	74	3.9%
Total Developed	462	85.5%	637	82.0%	740	85.9%	857	85.2%	961	86.3%	1176	85.7%	1501	89.0%	1683	85.2%	1697	87.9%
Saudi Arabia	0	0.0%	0	0.0%	3	0.3%	11	1.1%	4	0.4%	7	0.5%	3	0.2%	4	0.2%	2	0.1%
Other OPEC	0	0.0%	4	0.5%	2	0.2%	1	0.1%	0	0.0%	0	0.0%	4	0.3%	10	0.5%	1	0.0%
Total OPEC	0	0.0%	4	0.5%	4	0.5%	12	1.2%	4	0.4%	8	0.5%	8	0.5%	14	0.7%	3	0.1%
Brazil	8	1.5%	37	4.7%	15	1.7%	18	1.8%	12	1.1%	21	1.5%	28	1.6%	36	1.8%	23	1.2%
Mexico	21	3.8%	35	4.5%	36	4.1%	35	3.4%	49	4.4%	68	5.0%	35	2.1%	31	1.6%	44	2.3%
Other Latin America	14	2.7%	23	2.9%	13	1.5%	14	1.3%	7	0.6%	20	1.5%	28	1.6%	25	1.3%	10	0.5%
Total Latin America	43	8.0%	94	12.1%	63	7.3%	66	6.6%	68	6.1%	109	7.9%	91	5.4%	92	4.6%	77	4.0%
South Korea	5	0.9%	7	0.8%	8	1.0%	11	1.1%	12	1.1%	6	0.5%	14	0.8%	63	3.2%	46	2.4%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	44	2.2%	28	1.5%
Taiwan	21	3.9%	23	3.0%	29	3.4%	43	4.3%	45	4.0%	44	3.2%	47	2.8%	51	2.6%	50	2.6%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%	1	0.0%	1	0.0%
Total Asian NICS	26	4.8%	31	3.9%	39	4.5%	56	5.6%	58	5.2%	52	3.8%	64	3.8%	158	8.0%	125	6.5%
Other Developing Countries	6	1.2%	8	1.0%	11	1.2%	11	1.1%	18	1.6%	18	1.3%	18	1.1%	19	1.0%	18	0.9%
Total Developing Countries	76	14.0%	132	17.1%	115	13.4%	144	14.3%	148	13.3%	186	13.5%	176	10.4%	274	13.9%	222	11.5%
China	2	0.4%	5	0.6%	2	0.2%	3	0.3%	3	0.3%	8	0.6%	9	0.5%	12	0.6%	9	0.5%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	3	0.4%	4	0.5%	2	0.2%	1	0.1%	3	0.2%	1	0.1%	5	0.3%	3	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	3	0.5%	7	0.9%	6	0.7%	5	0.5%	5	0.4%	11	0.8%	10	0.6%	17	0.9%	12	0.6%
World	541	100.0%	777	100.0%	861	100.0%	1006	100.0%	1113	100.0%	1373	100.0%	1687	100.0%	1974	100.0%	1930	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.26
TRADE BALANCE (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORM

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	291	251	189	159	270	181	208	565	658
Japan	111	97	38	44	76	178	139	132	196
United Kingdom	85	83	52	33	63	67	92	126	11
Germany	-34	-53	-33	-39	-64	-48	-52	-39	-48
Netherlands	119	166	155	154	164	259	309	405	448
France	-3	-18	-34	-29	-17	-15	-5	-10	-24
Italy	6	11	7	8	22	36	29	-8	-6
Other E.C.	197	206	200	226	264	351	384	446	634
Total E.C.	371	396	347	353	432	650	757	919	1015
Other Developed	144	137	129	134	188	250	287	234	280
Total Developed	917	881	703	690	966	1259	1390	1850	2148
Saudi Arabia	40	37	27	10	15	23	18	18	40
Other OPEC	181	181	154	213	230	276	239	236	353
Total OPEC	220	218	181	223	245	299	257	254	393
Brazil	41	3	30	37	41	38	71	48	93
Mexico	210	174	215	230	247	341	507	502	556
Other Latin America	275	292	256	332	459	560	476	509	678
Total Latin America	525	469	501	599	747	940	1054	1059	1327
South Korea	90	95	72	110	171	205	228	201	266
Singapore	55	44	27	42	67	98	139	100	172
Taiwan	76	70	37	75	165	238	237	204	310
Other Asian NICS	87	93	81	145	237	432	315	359	462
Total Asian NICS	307	301	217	372	640	974	919	864	1210
Other Developing Countries	193	134	113	139	202	257	307	378	403
Total Developing Countries	1187	1038	941	1236	1716	2302	2444	2455	3151
China	90	229	225	188	236	567	188	140	259
USSR	3	4	3	2	1	1	10	12	48
Eastern Europe	1	-2	-3	-1	1	1	7	-3	1
Other CPE	0	0	0	0	0	1	0	0	0
Total CPE	93	231	225	188	238	570	206	149	308
World	2197	2149	1869	2114	2920	4130	4040	4454	5607

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.27
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	328	26.3%	350	25.5%	304	23.9%	291	21.0%	395	23.8%	445	22.3%	433	19.7%	735	27.9%	756	27.1%
Japan	96	7.7%	103	7.5%	103	8.1%	112	8.0%	141	8.5%	162	8.1%	188	8.5%	195	7.4%	194	7.0%
United Kingdom	66	5.3%	79	5.8%	76	6.0%	88	6.4%	90	5.4%	113	5.7%	135	6.1%	135	5.1%	124	4.4%
Germany	59	4.7%	72	5.3%	72	5.7%	102	7.4%	98	5.9%	132	6.6%	100	4.5%	142	5.4%	122	4.4%
Netherlands	23	1.8%	26	1.9%	33	2.6%	44	3.2%	51	3.1%	63	3.1%	87	3.9%	115	4.4%	122	4.4%
France	40	3.2%	42	3.0%	39	3.1%	41	3.0%	51	3.1%	51	2.6%	60	2.7%	69	2.6%	80	2.9%
Italy	14	1.1%	17	1.2%	19	1.5%	19	1.4%	23	1.4%	29	1.4%	47	2.1%	58	2.2%	45	1.6%
Other E.C.	104	8.4%	122	8.9%	100	7.8%	108	7.8%	132	8.0%	131	6.5%	188	8.5%	182	6.9%	190	6.8%
Total E.C.	307	24.6%	358	26.1%	338	26.6%	403	29.0%	446	26.9%	519	26.0%	616	28.0%	700	26.6%	683	24.5%
Other Developed	115	9.3%	134	9.8%	111	8.7%	127	9.2%	142	8.6%	164	8.2%	196	8.9%	199	7.6%	184	6.6%
Total Developed	846	67.8%	946	68.8%	856	67.3%	933	67.3%	1124	67.7%	1290	64.5%	1432	65.1%	1829	69.5%	1817	65.2%
Saudi Arabia	42	3.4%	24	1.8%	16	1.3%	9	0.7%	10	0.6%	15	0.7%	18	0.8%	20	0.8%	32	1.1%
Other OPEC	41	3.3%	46	3.4%	28	2.2%	25	1.8%	26	1.6%	30	1.5%	42	1.9%	43	1.6%	55	2.0%
Total OPEC	83	6.7%	71	5.1%	44	3.4%	35	2.5%	36	2.2%	45	2.2%	61	2.8%	63	2.4%	87	3.1%
Brazil	16	1.3%	22	1.6%	20	1.6%	28	2.0%	21	1.2%	28	1.4%	34	1.5%	34	1.3%	50	1.8%
Mexico	71	5.7%	103	7.5%	136	10.7%	145	10.5%	184	11.1%	277	13.9%	281	12.7%	320	12.2%	354	12.7%
Other Latin America	110	8.8%	113	8.2%	84	6.6%	89	6.4%	95	5.7%	102	5.1%	113	5.1%	116	4.4%	148	5.3%
Total Latin America	197	15.8%	238	17.3%	240	18.9%	262	18.9%	300	18.1%	408	20.4%	427	19.4%	470	17.9%	552	19.8%
South Korea	11	0.9%	17	1.2%	11	0.9%	14	1.0%	25	1.5%	41	2.0%	47	2.2%	62	2.3%	71	2.5%
Singapore	13	1.0%	15	1.1%	16	1.2%	15	1.1%	18	1.1%	24	1.2%	58	2.6%	43	1.6%	42	1.5%
Taiwan	9	0.8%	11	0.8%	10	0.8%	19	1.4%	29	1.7%	38	1.9%	42	1.9%	46	1.7%	57	2.0%
Other Asian NICS	14	1.1%	13	1.0%	14	1.1%	19	1.4%	26	1.6%	51	2.6%	44	2.0%	49	1.9%	60	2.2%
Total Asian NICS	48	3.8%	55	4.0%	52	4.1%	67	4.9%	98	5.9%	154	7.7%	191	8.7%	200	7.6%	230	8.2%
Other Developing Countries	33	2.6%	37	2.7%	27	2.1%	32	2.3%	37	2.3%	46	2.3%	49	2.2%	58	2.2%	69	2.5%
Total Developing Countries	335	26.9%	368	26.8%	345	27.1%	381	27.4%	454	27.3%	633	31.6%	716	32.5%	773	29.4%	915	32.9%
China	1	0.1%	2	0.1%	3	0.2%	4	0.3%	16	0.9%	21	1.1%	16	0.7%	11	0.4%	20	0.7%
USSR	64	5.1%	57	4.1%	66	5.2%	59	4.3%	65	3.9%	55	2.8%	37	1.7%	18	0.7%	28	1.0%
Eastern Europe	2	0.1%	2	0.1%	2	0.2%	10	0.7%	1	0.1%	2	0.1%	1	0.0%	2	0.1%	5	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	66	5.3%	60	4.4%	71	5.6%	74	5.3%	82	4.9%	78	3.9%	54	2.4%	31	1.2%	54	1.9%
World	1247	100.0%	1374	100.0%	1272	100.0%	1387	100.0%	1660	100.0%	2001	100.0%	2202	100.0%	2633	100.0%	2786	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.28
IMPORTS BY COUNTRY OF ORIGIN(MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	150	19.9%	197	20.6%	196	19.4%	226	19.3%	262	19.7%	347	22.0%	356	21.9%	403	22.7%	452	24.4%
Japan	136	18.0%	183	19.1%	209	20.7%	264	22.6%	301	22.7%	338	21.5%	339	20.8%	369	20.8%	374	20.2%
United Kingdom	63	8.4%	59	6.2%	60	5.9%	62	5.3%	76	5.7%	98	6.2%	91	5.6%	109	6.1%	114	6.2%
Germany	108	14.3%	120	12.6%	125	12.4%	143	12.2%	150	11.3%	170	10.8%	189	11.6%	207	11.7%	208	11.2%
Netherlands	4	0.5%	7	0.7%	10	1.0%	10	0.9%	14	1.1%	20	1.2%	19	1.2%	22	1.2%	18	1.0%
France	18	2.3%	27	2.8%	27	2.7%	37	3.2%	34	2.6%	31	2.0%	45	2.8%	43	2.4%	44	2.4%
Italy	34	4.5%	44	4.6%	42	4.1%	43	3.7%	46	3.4%	57	3.6%	49	3.0%	40	2.3%	43	2.3%
Other E.C.	32	4.2%	39	4.1%	46	4.6%	44	3.8%	57	4.3%	48	3.1%	48	3.0%	55	3.1%	55	2.9%
Total E.C.	259	34.3%	296	31.0%	309	30.7%	339	29.0%	377	28.4%	424	27.0%	442	27.1%	476	26.9%	482	26.0%
Other Developed	25	3.4%	36	3.8%	37	3.7%	44	3.8%	46	3.5%	53	3.3%	56	3.4%	68	3.8%	64	3.5%
Total Developed	570	75.6%	712	74.5%	751	74.5%	873	74.6%	987	74.3%	1162	73.8%	1193	73.2%	1317	74.3%	1372	74.0%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	4	0.2%	3	0.2%
Total OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	4	0.2%	3	0.2%
Brazil	7	0.9%	13	1.4%	13	1.3%	13	1.1%	13	1.0%	29	1.8%	20	1.3%	24	1.4%	19	1.0%
Mexico	15	2.0%	23	2.4%	32	3.2%	45	3.9%	49	3.7%	57	3.6%	59	3.6%	76	4.3%	80	4.3%
Other Latin America	8	1.0%	8	0.8%	9	0.9%	10	0.8%	12	0.9%	12	0.8%	29	1.8%	31	1.7%	30	1.6%
Total Latin America	29	3.9%	44	4.6%	55	5.4%	68	5.8%	74	5.6%	98	6.2%	108	6.6%	131	7.4%	129	7.0%
South Korea	8	1.1%	17	1.8%	24	2.4%	39	3.3%	49	3.7%	79	5.0%	74	4.5%	77	4.4%	82	4.4%
Singapore	0	0.0%	0	0.0%	1	0.1%	2	0.2%	3	0.2%	3	0.2%	6	0.4%	7	0.4%	11	0.6%
Taiwan	130	17.2%	152	16.0%	144	14.2%	152	13.0%	173	13.0%	184	11.7%	195	12.0%	183	10.3%	200	10.8%
Other Asian NICS	2	0.3%	3	0.3%	3	0.3%	3	0.3%	3	0.2%	3	0.2%	2	0.1%	2	0.1%	3	0.2%
Total Asian NICS	140	18.6%	173	18.1%	171	17.0%	196	16.8%	228	17.1%	268	17.0%	276	16.9%	269	15.2%	295	15.9%
Other Developing Countries	13	1.7%	24	2.5%	29	2.9%	32	2.7%	37	2.8%	44	2.8%	50	3.1%	52	3.0%	53	2.9%
Total Developing Countries	183	24.3%	242	25.3%	257	25.4%	296	25.3%	338	25.5%	411	26.1%	435	26.7%	454	25.6%	479	25.8%
China	0	0.0%	0	0.0%	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%	3	0.2%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	1	0.1%	1	0.1%	1	0.1%	2	0.1%	2	0.2%	2	0.1%	2	0.1%	2	0.1%	4	0.2%
World	754	100.0%	956	100.0%	1009	100.0%	1171	100.0%	1327	100.0%	1574	100.0%	1629	100.0%	1773	100.0%	1855	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.29
TRADE BALANCE (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	177	153	108	66	133	99	77	331	304
Japan	-40	-80	-106	-152	-161	-176	-151	-175	-180
United Kingdom	3	20	16	26	14	15	43	26	9
Germany	-49	-48	-53	-40	-51	-37	-89	-65	-86
Netherlands	19	19	23	33	37	43	67	93	104
France	23	15	12	4	16	20	15	26	36
Italy	-20	-27	-23	-24	-22	-29	-2	18	2
Other E.C.	73	83	53	64	75	83	140	127	135
Total E.C.	48	62	29	63	69	95	174	224	201
Other Developed	90	98	74	83	96	111	140	131	119
Total Developed	276	234	105	59	138	128	239	512	444
Saudi Arabia	42	24	16	9	10	15	18	20	32
Other OPEC	41	46	26	25	26	29	41	40	52
Total OPEC	83	70	42	34	36	44	59	60	84
Brazil	10	9	7	15	8	0	13	10	31
Mexico	56	80	104	100	136	221	222	244	274
Other Latin America	102	105	75	80	83	90	84	86	118
Total Latin America	168	194	186	195	226	310	320	339	423
South Korea	3	-1	-13	-25	-25	-38	-26	-16	-11
Singapore	13	14	15	13	16	22	52	36	31
Taiwan	-120	-142	-133	-133	-144	-146	-154	-137	-143
Other Asian NICS	12	10	12	16	23	49	42	47	57
Total Asian NICS	-93	-118	-120	-129	-130	-114	-85	-70	-66
Other Developing Countries	20	13	-2	0	0	2	-1	5	16
Total Developing Countries	152	126	88	85	115	222	281	319	437
China	1	2	3	3	15	20	16	10	17
USSR	64	57	66	59	65	55	37	18	28
Eastern Europe	1	0	2	9	0	1	0	1	4
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	65	59	70	72	80	76	52	29	49
World	493	419	263	216	333	426	572	860	930

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.30
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	392	15.0%	464	16.3%	444	17.2%	394	14.4%	461	14.8%	567	15.2%	694	15.1%	1097	20.0%	1203	20.0%
Japan	254	9.7%	273	9.6%	289	11.2%	293	10.7%	307	9.9%	358	9.6%	536	11.7%	564	10.3%	659	11.0%
United Kingdom	96	3.7%	100	3.5%	101	3.9%	103	3.8%	153	4.9%	196	5.3%	224	4.9%	208	3.8%	259 351	5.8%
Germany	73	2.8%	84	3.0%	84	3.3%	95	3.5%	95	3.0%	125	3.4%	147	3.2%	270	4.9%	312	5.2%
Netherlands	133	5.1%	122	4.3%	102	4.0%	122	4.5%	144	4.6%	180	4.8%	179	3.9%	266	4.9%	255	4.2%
France	78	3.0%	69	2.4%	82	3.2%	95	3.5%	124	4.0%	161	4.3%	199	4.4%	300	5.5%	137	2.3%
Italy	34	1.3%	38	1.4%	37	1.4%	50	1.8%	44	1.4%	57	1.5%	65	1.4%	110	2.0%	110	1.8%
Other E.C.	257	9.9%	272	9.5%	272	10.5%	347	12.6%	384	12.3%	448	12.0%	490	10.7%	452	8.3%	563	9.3%
Total E.C.	637	24.4%	646	22.7%	641	24.8%	763	27.8%	899	28.8%	1110	29.8%	1239	27.0%	1607	29.3%	1727	28.7%
Other Developed	254	9.7%	313	11.0%	213	8.3%	238	8.7%	287	9.2%	343	9.2%	430	9.4%	374	6.8%	371	6.2%
Total Developed	1537	58.9%	1696	59.5%	1586	61.5%	1689	61.6%	1955	62.7%	2378	63.8%	2899	63.3%	3641	66.5%	3961	65.8%
Saudi Arabia	53	2.0%	52	1.8%	37	1.4%	39	1.4%	54	1.7%	44	1.2%	51	1.1%	69	1.3%	80	1.3%
Other OPEC	147	5.6%	175	6.1%	171	6.6%	156	5.7%	177	5.7%	206	5.5%	225	4.9%	238	4.3%	290	4.8%
Total OPEC	199	7.6%	227	8.0%	208	8.1%	195	7.1%	231	7.4%	250	6.7%	276	6.0%	307	5.6%	370	6.2%
Brazil	110	4.2%	86	3.0%	73	2.8%	103	3.8%	84	2.7%	96	2.6%	106	2.3%	108	2.0%	111	1.9%
Mexico	83	3.2%	98	3.4%	109	4.2%	103	3.8%	104	3.3%	130	3.5%	208	4.5%	252	4.6%	311	5.2%
Other Latin America	328	12.6%	382	13.4%	318	12.3%	347	12.7%	368	11.8%	399	10.7%	474	10.3%	485	8.9%	554	9.2%
Total Latin America	520	19.9%	567	19.9%	500	19.4%	554	20.2%	556	17.8%	625	16.8%	788	17.2%	844	15.4%	977	16.2%
South Korea	46	1.7%	46	1.6%	36	1.4%	52	1.9%	58	1.9%	80	2.1%	167	3.7%	206	3.8%	202	3.3%
Singapore	97	3.7%	113	4.0%	95	3.7%	99	3.6%	121	3.9%	123	3.3%	156	3.4%	175	3.2%	174	2.9%
Taiwan	42	1.6%	39	1.4%	32	1.2%	41	1.5%	57	1.8%	60	1.6%	95	2.1%	94	1.7%	104	1.7%
Other Asian NICS	22	0.8%	31	1.1%	24	0.9%	24	0.9%	45	1.5%	59	1.6%	38	0.8%	40	0.7%	50	0.8%
Total Asian NICS	206	7.9%	229	8.0%	187	7.3%	216	7.9%	282	9.0%	322	8.6%	455	9.9%	515	9.4%	529	8.8%
Other Developing Countries	157	6.0%	191	6.7%	139	5.4%	140	5.1%	160	5.1%	197	5.3%	223	4.9%	234	4.3%	243	4.0%
Total Developing Countries	1014	38.9%	1101	38.6%	943	36.5%	1002	36.5%	1110	35.6%	1274	34.2%	1633	35.6%	1792	32.7%	1951	32.4%
China	37	1.4%	20	0.7%	23	0.9%	24	0.9%	29	0.9%	40	1.1%	37	0.8%	33	0.6%	50	0.8%
USSR	6	0.2%	8	0.3%	10	0.4%	8	0.3%	8	0.3%	19	0.5%	9	0.2%	4	0.1%	51	0.8%
Eastern Europe	7	0.3%	14	0.5%	10	0.4%	9	0.3%	6	0.2%	8	0.2%	5	0.1%	7	0.1%	8	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	50	1.9%	42	1.5%	43	1.7%	41	1.5%	44	1.4%	66	1.8%	51	1.1%	44	0.8%	108	1.8%
World	2608	100.0%	2849	100.0%	2581	100.0%	2742	100.0%	3118	100.0%	3725	100.0%	4583	100.0%	5478	100.0%	6020	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.31
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990		1991	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	101	10.5%	117	10.1%	126	9.1%	144	11.1%	166	11.7%	172	10.3%	201	11.3%	237	11.7%	302	14.2%
Japan	107	11.1%	143	12.3%	148	10.7%	193	14.9%	235	16.5%	301	18.1%	197	11.1%	250	12.3%	280	13.2%
United Kingdom	51	5.3%	58	5.0%	80	5.8%	96	7.4%	105	7.4%	119	7.2%	161	9.0%	158	7.8%	200	9.4%
Germany	96	10.0%	126	10.9%	121	8.7%	148	11.4%	205	14.4%	235	14.1%	295	16.6%	350	17.2%	331	15.6%
Netherlands	36	3.7%	43	3.7%	51	3.7%	62	4.8%	62	4.3%	72	4.3%	97	5.5%	107	5.3%	87	4.1%
France	53	5.6%	57	4.9%	56	4.0%	75	5.8%	88	6.2%	114	6.8%	118	6.6%	127	6.3%	139	6.5%
Italy	12	1.3%	29	2.5%	25	1.8%	29	2.2%	32	2.3%	29	1.8%	33	1.9%	42	2.1%	42	2.0%
Other E.C.	71	7.4%	78	6.8%	115	8.3%	110	8.5%	138	9.7%	176	10.6%	215	12.1%	206	10.1%	169	7.9%
Total E.C.	319	33.1%	392	33.9%	446	32.2%	520	40.1%	631	44.3%	746	44.8%	918	51.6%	990	48.8%	968	45.6%
Other Developed	167	17.4%	182	15.7%	190	13.7%	187	14.4%	181	12.7%	191	11.4%	223	12.6%	264	13.0%	266	12.5%
Total Developed	693	72.0%	833	72.1%	910	65.7%	1044	80.5%	1213	85.1%	1409	84.6%	1540	86.5%	1741	85.8%	1817	85.6%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%	2	0.1%	5	0.2%
Total OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%	2	0.1%	5	0.2%
Brazil	11	1.1%	19	1.7%	97	7.0%	24	1.9%	20	1.4%	31	1.9%	27	1.5%	24	1.2%	29	1.3%
Mexico	6	0.6%	145	12.5%	138	10.0%	19	1.5%	13	0.9%	17	1.0%	28	1.5%	52	2.5%	55	2.6%
Other Latin America	157	16.3%	23	2.0%	35	2.5%	35	2.7%	29	2.0%	48	2.9%	21	1.2%	28	1.4%	20	0.9%
Total Latin America	173	18.0%	188	16.2%	270	19.5%	79	6.1%	62	4.3%	96	5.8%	75	4.2%	104	5.1%	103	4.9%
South Korea	1	0.1%	3	0.3%	1	0.1%	7	0.5%	7	0.5%	4	0.2%	2	0.1%	4	0.2%	3	0.2%
Singapore	1	0.1%	3	0.2%	2	0.1%	1	0.1%	0	0.0%	3	0.2%	0	0.0%	0	0.0%	5	0.2%
Taiwan	6	0.6%	7	0.6%	11	0.8%	9	0.7%	8	0.6%	10	0.6%	11	0.6%	11	0.6%	11	0.5%
Other Asian NICS	3	0.3%	4	0.4%	6	0.5%	9	0.7%	11	0.7%	10	0.6%	6	0.3%	6	0.3%	7	0.3%
Total Asian NICS	11	1.1%	17	1.5%	20	1.5%	25	1.9%	27	1.9%	26	1.6%	19	1.0%	22	1.1%	26	1.2%
Other Developing Countries	34	3.5%	74	6.4%	63	4.5%	51	3.9%	51	3.6%	60	3.6%	73	4.1%	84	4.1%	80	3.8%
Total Developing Countries	226	23.5%	280	24.2%	356	25.7%	156	12.0%	141	9.9%	183	11.0%	167	9.4%	211	10.4%	214	10.1%
China	38	4.0%	39	3.3%	45	3.3%	52	4.0%	60	4.2%	54	3.2%	60	3.4%	61	3.0%	71	3.3%
USSR	1	0.1%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%	4	0.2%
Eastern Europe	4	0.4%	4	0.4%	74	5.4%	45	3.5%	10	0.7%	18	1.1%	11	0.7%	14	0.7%	18	0.8%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	43	4.5%	43	3.7%	119	8.6%	98	7.5%	71	5.0%	73	4.4%	72	4.1%	76	3.8%	93	4.4%
World	962	100.0%	1156	100.0%	1385	100.0%	1298	100.0%	1425	100.0%	1665	100.0%	1780	100.0%	2028	100.0%	2123	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.32
TRADE BALANCE (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE CLASSIFIED

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
Canada	291	347	318	250	295	395	492	860	901
Japan	147	130	141	100	72	57	339	313	379
United Kingdom	46	42	21	8	48	77	63	50	150
Germany	-23	-42	-37	-52	-111	-110	-148	-80	-20
Netherlands	97	79	51	60	82	108	82	159	168
France	24	12	26	20	36	47	81	173	-2
Italy	22	10	12	21	12	28	32	68	68
Other E.C.	186	193	157	237	246	271	275	247	394
Total E.C.	318	254	194	243	269	365	320	617	759
Other Developed	87	131	24	51	106	153	207	109	105
Total Developed	843	863	676	644	742	969	1359	1900	2144
Saudi Arabia	53	52	37	39	54	44	51	69	80
Other OPEC	10	173	166	148	170	186	224	235	285
Total OPEC	63	225	203	187	224	231	275	304	365
Brazil	99	67	-24	79	64	65	79	83	83
Mexico	76	-47	-29	84	91	112	180	200	256
Other Latin America	171	359	284	312	339	351	454	457	535
Total Latin America	347	379	231	475	494	528	713	741	874
South Korea	45	43	35	45	51	76	165	202	198
Singapore	95	110	93	99	121	120	155	175	169
Taiwan	36	32	21	32	49	50	84	83	94
Other Asian NICS	19	27	18	16	35	50	32	33	43
Total Asian NICS	195	212	167	191	255	296	437	493	503
Other Developing Countries	124	117	76	89	109	137	150	151	163
Total Developing Countries	788	822	587	846	969	1091	1466	1582	1737
China	-1	-18	-22	-28	-31	-13	-23	-28	-21
USSR	5	8	10	7	8	18	8	3	47
Eastern Europe	3	10	-64	-36	-4	-10	-6	-8	-10
Other CPE	0	0	0	0	0	0	0	0	0
Total CPE	7	-1	-76	-57	-27	-6	-21	-32	16
World	1646	1693	1196	1444	1693	2060	2803	3450	3897

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.33
U.S. CHEMICALS TRADE WITH CANADA (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	2576	2857	2714	2613	3221	3751	4210	6050	6555	20.2%	8.3%
	Imports	2408	3110	2882	2783	3074	3841	3934	4305	4352	9.4%	1.1%
	Balance	168	-253	-168	-170	147	-90	276	1745	2202		
51 Organic Chemicals	Exports	604	667	636	642	741	867	941	1123	1088	11.1%	-3.1%
	Imports	546	575	585	463	529	803	604	818	757	10.3%	-7.5%
	Balance	58	92	51	179	212	64	337	305	331		
52 Inorganic Chemicals	Exports	297	312	329	345	387	484	483	460	489	7.2%	6.2%
	Imports	686	1124	968	978	1065	1117	1251	1061	1025	1.0%	-3.4%
	Balance	-389	-812	-639	-633	-678	-633	-768	-601	-537		
53 Dyeing, Tanning & Coloring	Exports	164	179	172	156	223	227	230	421	482	25.3%	14.4%
	Imports	51	62	63	69	80	103	112	156	176	20.6%	12.7%
	Balance	113	117	109	87	143	124	118	265	306		
54 Medicinal & Pharmaceutical Products	Exports	174	174	181	185	212	255	266	450	552	24.4%	22.7%
	Imports	16	21	26	24	32	45	72	101	118	37.5%	16.7%
	Balance	158	153	155	161	180	210	194	349	434		
55 Essential Oils & Perfume Materials	Exports	118	116	103	105	140	165	215	401	521	37.8%	29.9%
	Imports	34	41	66	81	80	95	133	168	190	18.6%	13.1%
	Balance	84	75	37	24	60	70	82	233	331		
56 Fertilizers, Manufactured	Exports	119	200	171	106	110	115	245	188	197	13.2%	4.7%
	Imports	735	831	666	569	579	715	708	751	723	4.9%	-3.8%
	Balance	-616	-631	-495	-463	-469	-600	-463	-563	-526		
57 Plastics in Primary Form	Exports	381	394	374	387	552	625	704	1175	1267	26.8%	7.8%
	Imports	90	143	185	228	281	445	496	610	609	21.7%	-0.2%
	Balance	291	251	189	159	271	180	208	565	658		
58 Plastics in Non-Primary Form	Exports	328	350	304	291	395	445	433	735	756	21.0%	2.9%
	Imports	150	197	196	226	262	347	356	403	452	14.9%	12.2%
	Balance	178	153	108	65	133	98	77	332	304		
59 Chemical Materials & Products	Exports	392	464	444	394	461	567	694	1097	1203	25.0%	9.7%
	Imports	101	117	126	144	166	172	201	237	302	16.0%	27.6%
	Balance	291	347	318	250	295	395	493	860	901		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.34
U.S. CHEMICALS TRADE WITH MEXICO (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	1055	1255	1408	1261	1431	1836	2195	2298	2624	15.8%	14.2%
	Imports	287	509	451	330	393	567	582	665	721	16.9%	8.4%
	Balance	768	746	957	931	1038	1269	1613	1633	1903		
51 Organic Chemicals	Exports	420	544	604	476	523	665	680	598	705	8.2%	17.8%
	Imports	37	73	51	49	65	127	158	157	249	38.4%	58.4%
	Balance	383	471	553	427	458	538	522	441	456		
52 Inorganic Chemicals	Exports	114	115	136	127	168	182	205	223	259	15.3%	16.2%
	Imports	166	173	134	124	137	193	204	236	182	8.0%	-22.7%
	Balance	-52	-58	2	3	31	-11	1	-13	77		
53 Dyeing, Tanning and Coloring	Exports	38	45	46	48	58	67	69	98	113	18.8%	15.7%
	Imports	6	25	31	13	20	41	33	39	26	14.7%	-33.9%
	Balance	32	20	15	35	38	26	36	59	88		
54 Medicinal and Pharmaceutical Products	Exports	30	38	46	47	48	57	73	105	120	20.6%	14.3%
	Imports	12	12	12	19	23	22	17	15	18	-0.8%	21.6%
	Balance	18	26	34	28	25	35	56	90	102		
55 Essential Oils and Perfume Materials	Exports	18	21	25	26	26	35	83	125	112	34.0%	-10.2%
	Imports	17	18	17	22	33	37	39	44	52	18.9%	18.7%
	Balance	1	3	8	4	-7	-2	44	81	60		
56 Fertilizers, Manufactured	Exports	51	82	55	24	24	13	55	44	49	15.5%	12.3%
	Imports	8	4	1	3	6	3	10	15	15	37.9%	-0.4%
	Balance	43	78	54	21	18	10	45	29	34		
57 Plastics in Primary Form	Exports	230	209	250	264	296	409	542	533	600	17.9%	12.6%
	Imports	21	35	36	35	49	68	35	31	44	4.7%	42.2%
	Balance	209	174	214	229	247	341	507	502	556		
58 Plastics in Non-Primary Form	Exports	71	103	136	145	184	277	281	320	354	19.5%	10.5%
	Imports	15	23	32	45	49	57	59	76	80	12.1%	4.9%
	Balance	56	80	104	100	135	220	222	244	274		
59 Chemical Materials & Products	Exports	83	98	109	103	104	130	208	252	311	24.7%	23.4%
	Imports	6	145	138	19	13	17	28	52	55	23.7%	5.7%
	Balance	77	-47	-29	84	91	113	180	200	256		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.35
U.S. CHEMICALS TRADE WITH JAPAN (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	2603	3000	2914	3062	3401	3982	4664	4582	5047	10.5%	10.1%
	Imports	1155	1408	1526	1922	2301	2399	2373	2391	2706	7.1%	13.2%
	Balance	1448	1592	1388	1140	1100	1583	2291	2191	2341		
51 Organic Chemicals	Exports	653	704	690	743	899	1120	1175	1124	1177	9.6%	4.7%
	Imports	404	480	524	681	814	859	926	843	983	7.6%	16.6%
	Balance	249	224	166	62	85	261	249	281	194		
52 Inorganic Chemicals	Exports	632	834	820	909	872	936	1130	963	1130	4.4%	17.3%
	Imports	106	107	110	110	157	151	164	158	185	10.9%	17.0%
	Balance	526	727	710	799	715	785	966	805	945		
53 Dyeing, Tanning and Coloring	Exports	51	56	62	68	76	95	93	116	113	10.6%	-3.0%
	Imports	122	178	195	272	340	260	154	169	219	-4.2%	29.6%
	Balance	-71	-122	-133	-204	-264	-165	-61	-53	-107		
54 Medicinal and Pharmaceutical Products	Exports	504	524	549	576	613	725	785	764	809	7.0%	5.9%
	Imports	112	104	115	163	174	195	213	213	270	10.6%	26.6%
	Balance	392	420	434	413	439	530	572	551	539		
55 Essential Oils and Perfume Materials	Exports	58	74	71	78	125	111	163	249	284	29.5%	14.1%
	Imports	23	30	34	45	56	74	65	65	67	8.4%	3.5%
	Balance	35	44	37	33	69	37	98	184	217		
56 Fertilizers, Manufactured	Exports	103	156	108	48	73	79	151	160	165	28.0%	3.2%
	Imports	4	5	5	3	3	4	10	7	7	19.8%	6.0%
	Balance	99	151	103	45	70	75	141	153	158		
57 Plastics in Primary Form	Exports	252	276	223	234	294	397	443	447	517	17.2%	15.5%
	Imports	142	179	185	190	219	219	305	315	320	11.0%	1.7%
	Balance	110	97	38	44	75	178	138	132	196		
58 Plastics in Non-Primary Form	Exports	96	103	103	112	141	162	188	195	194	11.6%	-0.5%
	Imports	136	183	209	264	301	338	339	369	374	7.2%	1.4%
	Balance	-40	-80	-106	-152	-160	-176	-151	-174	-180		
59 Chemical Materials & Products	Exports	254	273	289	293	307	358	536	564	659	17.6%	16.9%
	Imports	107	143	148	193	235	301	197	250	280	7.8%	12.2%
	Balance	147	130	141	100	72	57	339	314	379		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.36
U.S. CHEMICALS TRADE WITH TOTAL E.C. (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	5059	5810	5911	6271	7085	8318	9758	10510	11257	12.4%	7.1%
	Imports	4565	5870	6335	6563	7333	9066	9158	9729	10418	9.7%	7.1%
	Balance	494	-60	-424	-292	-248	-748	600	781	838		
51 Organic Chemicals	Exports	1476	1629	1745	1773	2202	2619	3036	3038	3295	13.2%	8.4%
	Imports	1843	2320	2467	2420	2779	3690	3603	3595	3840	9.7%	6.8%
	Balance	-367	-691	-722	-647	-577	-1071	-567	-557	-546		
52 Inorganic Chemicals	Exports	653	984	1030	995	989	906	939	757	795	-4.4%	5.0%
	Imports	734	980	1127	1039	897	1111	964	1021	1070	0.6%	4.8%
	Balance	-81	4	-97	-44	92	-205	-25	-264	-276		
53 Dyeing, Tanning and Coloring	Exports	168	155	143	183	224	278	261	402	368	15.0%	-8.5%
	Imports	351	426	442	553	640	683	615	657	714	5.2%	8.7%
	Balance	-183	-271	-299	-370	-416	-405	-354	-255	-346		
54 Medicinal and Pharmaceutical Products	Exports	816	867	916	1073	1039	1320	1573	1723	1943	12.6%	12.8%
	Imports	497	687	658	691	922	1127	1223	1461	1772	20.7%	21.3%
	Balance	319	180	258	382	117	193	350	262	171		
55 Essential Oils and Perfume Materials	Exports	183	171	186	185	210	286	341	410	508	22.4%	23.9%
	Imports	273	399	451	515	598	718	682	778	817	9.7%	5.0%
	Balance	-90	-228	-265	-330	-388	-432	-341	-368	-309		
56 Fertilizers, Manufactured	Exports	232	310	222	133	214	154	357	270	231	11.7%	-14.5%
	Imports	72	77	91	76	60	91	70	68	62	-4.0%	-8.8%
	Balance	160	233	131	57	154	63	287	202	169		
57 Plastics in Primary Form	Exports	588	689	691	763	861	1125	1397	1603	1708	17.5%	6.5%
	Imports	217	294	344	409	429	476	640	683	693	11.1%	1.5%
	Balance	371	395	347	354	432	649	757	920	1015		
58 Plastics in Non-Primary Form	Exports	307	358	338	403	446	519	616	700	683	11.1%	-2.4%
	Imports	259	296	309	339	377	424	442	476	482	7.3%	1.2%
	Balance	48	62	29	64	69	95	174	224	201		
59 Chemical Materials & Products	Exports	637	646	641	763	899	1110	1239	1607	1727	17.8%	7.5%
	Imports	319	392	446	520	631	746	918	990	968	13.2%	-2.2%
	Balance	318	254	195	243	268	364	321	617	759		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.37
U.S. CHEMICALS TRADE WITH ASIAN NICs (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	1771	1979	1737	2273	3031	4199	4733	4656	5172	17.9%	11.1%
	Imports	257	337	416	567	633	718	744	1024	1171	15.6%	14.3%
	Balance	1514	1642	1321	1706	2398	3481	3989	3632	4001		
51 Organic Chemicals	Exports	671	716	717	1011	1348	1960	2149	1884	1980	14.4%	5.1%
	Imports	54	70	136	212	232	267	272	430	546	20.8%	26.9%
	Balance	617	646	581	799	1116	1693	1877	1454	1434		
52 Inorganic Chemicals	Exports	240	246	217	253	250	304	442	375	343	6.3%	-8.5%
	Imports	10	14	12	15	14	20	23	20	20	6.0%	0.2%
	Balance	230	232	205	238	236	284	419	355	323		
53 Dyeing, Tanning and Coloring	Exports	64	68	63	89	121	141	144	203	213	19.1%	5.1%
	Imports	6	10	9	12	16	22	31	51	57	36.6%	11.9%
	Balance	58	58	54	77	105	119	113	152	156		
54 Medicinal and Pharmaceutical Products	Exports	69	78	84	90	105	137	140	171	186	15.6%	8.8%
	Imports	3	10	6	7	10	16	9	24	39	41.0%	62.3%
	Balance	66	68	78	83	95	121	131	147	147		
55 Essential Oils and Perfume Materials	Exports	64	78	69	86	93	118	157	197	276	26.3%	40.3%
	Imports	7	12	22	43	48	48	50	47	63	7.9%	33.6%
	Balance	57	66	47	43	45	70	107	150	213		
56 Fertilizers, Manufactured	Exports	76	176	93	32	37	38	71	90	80	20.0%	-11.4%
	Imports	0	0	0	0	0	0	0	1	0		-88.2%
	Balance	76	176	93	32	37	38	71	89	80		
57 Plastics in Primary Form	Exports	333	332	256	428	698	1025	983	1022	1335	25.5%	30.6%
	Imports	26	31	39	56	58	52	64	158	125	17.4%	-21.0%
	Balance	307	301	217	372	640	973	919	864	1210		
58 Plastics in Non-Primary Form	Exports	48	55	52	67	98	154	191	200	230	27.9%	14.8%
	Imports	140	173	171	196	228	268	276	269	295	8.6%	9.8%
	Balance	-92	-118	-119	-129	-130	-114	-85	-69	-66		
59 Chemical Materials & Products	Exports	206	229	187	216	282	322	455	515	529	19.6%	2.7%
	Imports	11	17	20	25	27	26	19	22	26	0.7%	17.6%
	Balance	195	212	167	191	255	296	436	493	503		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.38
U.S. CHEMICALS TRADE WITH CHINA (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	353	645	507	422	748	1308	1136	1054	1671	31.7%	58.5%
	Imports	126	151	157	174	196	230	273	337	392	17.7%	16.4%
	Balance	227	494	350	248	552	1078	863	717	1279		
51 Organic Chemicals	Exports	33	98	89	81	153	280	286	245	270	27.2%	10.1%
	Imports	33	42	32	43	43	51	60	71	87	15.1%	22.3%
	Balance	0	56	57	38	110	229	226	174	183		
52 Inorganic Chemicals	Exports	20	19	18	66	155	188	82	20	31	-13.8%	57.0%
	Imports	15	31	38	33	39	53	57	99	91	22.5%	-8.2%
	Balance	5	-12	-20	33	116	135	25	-79	-59		
53 Dyeing, Tanning and Coloring	Exports	1	2	5	5	5	10	14	22	22	34.1%	-1.4%
	Imports	3	2	4	6	8	13	14	22	27	34.9%	22.0%
	Balance	-2	0	1	-1	-3	-3	0	0	-5		
54 Medicinal and Pharmaceutical Products	Exports	1	1	2	3	18	6	8	14	15	38.3%	8.6%
	Imports	21	17	21	21	25	26	50	47	78	30.0%	66.1%
	Balance	-20	-16	-19	-18	-7	-20	-42	-33	-63		
55 Essential Oils and Perfume Materials	Exports	0	1	1	2	3	5	7	12	14	47.2%	15.0%
	Imports	15	15	15	16	16	24	20	23	27	10.8%	16.3%
	Balance	-15	-14	-14	-14	-13	-19	-13	-11	-13		
56 Fertilizers, Manufactured	Exports	168	267	139	46	130	182	487	544	982	84.4%	80.5%
	Imports	0	0	0	0	1	0	2	0	0		
	Balance	168	267	139	46	129	182	485	544	982		
57 Plastics in Primary Form	Exports	92	234	226	191	239	575	197	151	268	7.0%	77.4%
	Imports	2	5	2	3	3	8	9	12	9	24.6%	-25.0%
	Balance	90	229	224	188	236	567	188	139	259		
58 Plastics in Non-Primary Form	Exports	1	2	3	4	16	21	16	11	20	37.6%	79.1%
	Imports	0	0	0	1	1	1	1	1	3	23.7%	189.2%
	Balance	1	2	3	3	15	20	15	10	17		
59 Chemical Materials & Products	Exports	37	20	23	24	29	40	37	33	50	15.6%	50.3%
	Imports	38	39	45	52	60	54	60	61	71	6.4%	16.2%
	Balance	-1	-19	-22	-28	-31	-14	-23	-28	-21		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.39
U.S. CHEMICALS TRADE WITH EASTERN EUROPE (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	67	101	90	94	65	59	77	58	62	-8.0%	6.7%
	Imports	53	117	183	163	72	103	100	80	79	-13.5%	-1.5%
	Balance	14	-16	-93	-69	-7	-44	-23	-22	-17		
51 Organic Chemicals	Exports	7	9	12	15	11	13	15	12	5	-18.5%	-55.0%
	Imports	10	21	33	33	27	26	15	12	13	-17.4%	5.6%
	Balance	-3	-12	-21	-18	-16	-13	0	0	-7		
52 Inorganic Chemicals	Exports	12	7	15	25	17	15	7	12	6	-24.1%	-47.5%
	Imports	5	4	4	5	6	10	4	6	7	6.3%	13.1%
	Balance	7	3	11	20	11	5	3	6	0		
53 Dyeing, Tanning and Coloring	Exports	2	1	2	2	1	2	1	1	1	-8.3%	30.0%
	Imports	1	2	9	5	2	8	4	4	9	12.9%	129.1%
	Balance	1	-1	-7	-3	-1	-6	-3	-3	-8		
54 Medicinal and Pharmaceutical Products	Exports	5	6	8	7	6	5	8	6	13	13.7%	121.7%
	Imports	5	5	7	9	7	7	10	13	14	10.0%	11.5%
	Balance	0	1	1	-2	-1	-2	-2	-7	-1		
55 Essential Oils and Perfume Materials	Exports	2	2	2	3	1	1	2	4	16	40.5%	310.0%
	Imports	1	1	1	1	1	1	1	1	2	17.9%	127.4%
	Balance	1	1	1	2	0	0	1	3	14		
56 Fertilizers, Manufactured	Exports	29	58	36	23	20	10	31	12	2	-36.4%	-80.0%
	Imports	24	75	50	61	17	29	52	22	12	-27.9%	-46.1%
	Balance	5	-17	-14	-38	3	-19	-21	-10	-9		
57 Plastics in Primary Form	Exports	1	1	2	1	2	4	8	2	4	31.3%	95.0%
	Imports	1	3	4	2	1	3	1	5	3	5.9%	-46.8%
	Balance	0	-2	-2	-1	1	1	7	-3	1		
58 Plastics in Non-Primary Form	Exports	2	2	2	10	1	2	1	2	5	-11.6%	170.0%
	Imports	1	1	1	1	1	1	1	1	1	6.8%	39.2%
	Balance	1	1	1	9	0	1	0	1	4		
59 Chemical Materials & Products	Exports	7	14	10	9	6	8	5	7	8	-3.3%	8.6%
	Imports	4	4	74	45	10	18	11	14	18	-17.2%	25.1%
	Balance	3	10	-64	-36	-4	-10	-6	-7	-10		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.40
U.S. CHEMICALS TRADE WITH THE USSR (MILLION DOLLARS)

SITC-Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
5 Total Chemicals & Related Products	Exports	305	266	318	294	282	277	332	280	326	2.1%	16.6%
	Imports	144	207	196	163	93	116	108	163	184	2.5%	12.9%
	Balance	161	59	122	131	189	161	224	117	142		
51 Organic Chemicals	Exports	0	4	2	9	6	10	6	4	14	9.9%	260.0%
	Imports	2	12	20	19	17	15	15	10	7	-17.5%	-27.5%
	Balance	-2	-8	-18	-10	-11	-5	-9	-6	7		
52 Inorganic Chemicals	Exports	169	143	132	86	87	80	15	5	5	-43.4%	0.0%
	Imports	98	142	119	84	64	77	83	151	155	13.1%	2.7%
	Balance	71	1	13	2	23	3	-68	-146	-150		
53 Dyeing, Tanning and Coloring	Exports	4	3	4	4	5	3	1	4	3	-3.2%	-15.0%
	Imports	0	0	0	0	0	0	0	0	0		
	Balance	4	3	4	4	5	3	1	4	3		
54 Medicinal and Pharmaceutical Products	Exports	1	1	1	1	1	2	13	25	47	115.8%	87.2%
	Imports	0	0	0	0	0	0	0	0	0		
	Balance	1	1	1	1	1	2	13	25	47		
55 Essential Oils and Perfume Materials	Exports	0	0	0	0	0	0	4	6	5		-11.7%
	Imports	0	0	0	0	0	0	0	0	0		
	Balance	0	0	0	0	0	0	4	6	5		
56 Fertilizers, Manufactured	Exports	58	47	100	126	110	107	237	201	124	-0.3%	-38.2%
	Imports	43	54	57	60	11	24	9	1	17	-22.5%	1580.5%
	Balance	15	-7	43	66	99	83	228	200	107		
57 Plastics in Primary Form	Exports	3	4	3	2	1	1	10	13	48	88.7%	267.7%
	Imports	0	0	0	0	0	0	0	0	0		
	Balance	3	4	3	2	1	1	10	13	48		
58 Plastics in Non-Primary Form	Exports	64	57	66	59	65	55	37	18	28	-13.6%	57.8%
	Imports	0	0	0	0	0	0	0	0	0		
	Balance	64	57	66	59	65	55	37	18	28		
59 Chemical Materials & Products	Exports	6	8	10	8	8	19	9	4	51	44.8%	1175.0%
	Imports	1	0	0	1	0	1	0	1	4	33.0%	315.6%
	Balance	5	8	10	7	8	18	9	3	47		

Source: U.S. Department of Commerce
SITC=Standard International Trade Code, Revision 3

TABLE 3.41
VOLUME OF U.S. CHEMICALS & RELATED PRODUCTS TRADE, IMPORT/EXPORT PRICES, AND TERMS OF TRADE*

Item/Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
In Millions of Current Dollars:											
Exports	19967	22830	21829	22522	26023	31909	36485	38983	42967	13.8%	10.2%
Imports	10945	13920	14715	15302	16567	20326	20752	22468	24169	9.6%	7.6%
Balance	9022	8910	7114	7220	9456	11583	15733	16515	18798	21.1%	13.8%
In Millions of 1985 Dollars:											
Exports	19828	22382	21829	23171	24389	26048	30379	32897	36382	9.4%	10.6%
Imports	10606	13475	14715	15348	15659	17225	17265	18723	19941	5.4%	6.5%
Balance	9223	8907	7114	7823	8730	8823	13114	14174	16440	16.0%	16.0%
Price Indices (1985=100)											
Exports:											
5 Chemicals & Related Products	100.7	102.0	100.0	97.2	106.7	122.5	120.1	118.5	118.1	4.0%	-0.3%
51 Organic Chemicals	n/a	104.0	100.0	96.9	115.0	146.0	139.1	125.0	117.3	3.9%	-6.2%
55 Essential Oils and Perfume Materials	n/a	n/a	100.0	104.0	106.7	116.9	123.8	126.6	128.2	4.3%	1.3%
56 Fertilizers, Manufactured	103.7	109.8	100.0	88.6	96.2	114.2	107.8	104.9	108.5	4.1%	3.4%
59 Chemical Materials & Products	n/a	97.6	100.0	99.4	97.6	102.9	109.4	115.2	118.9	3.6%	3.2%
Imports:											
5 Chemicals & Related Products	103.2	103.3	100.0	99.7	105.8	118.0	120.2	120.0	121.2	4.0%	1.0%
51 Organic Chemicals	n/a	n/a	100.0	91.0	99.3	109.9	113.7	116.1	113.8	4.6%	-2.0%
52 Inorganic Chemicals	n/a	108.8	100.0	96.0	90.1	93.4	87.9	86.0	87.3	-1.9%	1.5%
54 Medicinal and Pharmaceutical Products	n/a	100.3	100.0	112.6	123.5	141.9	151.8	154.3	158.1	7.0%	2.5%
55 Essential Oils and Perfume Materials	n/a	98.5	100.0	105.4	119.4	127.5	130.8	133.8	137.0	5.4%	2.4%
56 Fertilizers, Manufactured	n/a	113.0	100.0	91.0	107.6	136.6	137.1	132.1	141.9	9.3%	7.4%
59 Chemical Materials & Products	n/a	n/a	100.0	110.7	119.6	131.0	135.7	143.7	137.6	4.4%	-4.2%
Terms of Trade (Export Prices/Import Prices)											
5 Chemicals & Related Products	97.6	98.7	100.0	97.5	100.9	103.8	99.9	98.8	97.4	0.0%	-1.3%
51 Organic Chemicals	n/a	n/a	100.0	106.5	115.8	132.8	122.3	107.7	103.1	-0.6%	-4.3%
55 Essential Oils and Perfume Materials	n/a	n/a	100.0	98.7	89.4	91.7	94.6	94.6	93.6	-1.1%	-1.1%
56 Fertilizers, Manufactured	n/a	97.2	100.0	97.4	89.4	83.6	78.6	79.4	76.5	-4.7%	-3.7%
59 Chemical Materials & Products	n/a	n/a	100.0	89.8	81.6	78.5	80.6	80.2	86.4	-0.8%	7.8%

Source: U.S. Department of Commerce, Bureau of Labor Statistics
* Data series begin at differing years for the sub-components.

o Terms of trade -- the ratio of export prices to import prices -- measures the purchasing power of the U.S. chemical industry's exports in terms of the imports the exports can buy. When the ratio rises, the terms of trade improve. When it falls, the terms of trade deteriorate.

Section 4
Investment In Research and Development

The U.S. chemical industry has consistently been one of the largest U.S. private sector investors in research and development (R&D). New products and processes are the driving force of the continued international competitiveness of the U.S. chemical industry. Nearly 80,000 chemists, other scientists, engineers, and technicians are engaged constantly in developing new and better process technologies, new chemical compounds and products, and new applications for existing chemical products.

Prior to World War I, only three patents out of every 100 issued by the U.S. Patent Office were in the field of chemicals. In the 1980s, chemical patents accounted for about 15 percent of each year's total. This high level of research is engendering dividends to the industry as well as to society as a whole. The payoff is in a rapid rate of technological innovation evidenced in a constant stream of new products and production processes.

There are two broad categories of research: basic and applied. Basic (or fundamental) research can be defined as any planned search for unknown facts and principles of general validity, without regard to commercial objectives. Applied research, on the other hand, is an investigation made for a specific practical objective. It has been defined as any planned investigation with the intent of using known phenomena or substances to accomplish a particular objective. In general, the basic research of today is the foundation for tomorrow's applied research, which uses known facts to develop new processes or products.

Organized industrial research in the chemical industry did not begin until about 1900. Problems that arose during World War I gave new emphasis to research and marked the start of sizable programs. Since then, the industry's R&D effort has continued to expand, with spending reaching $13.3 billion in 1991. Today, most chemical companies allocate 4 to 6 percent of their annual sales for R&D. Moreover, unlike many other manufacturing industries, the U.S. chemical industry pays for most of its R&D. Government funding of chemical research is minimal; only about 1 percent of the industry total, compared with government funding of about 29 percent of total manufacturing R&D.

Most successful research in the chemical industry is accomplished only after intensive effort and major expenditures. Typically, it takes four to eight years from the time a project is conceived to the time a chemical product is commercialized in the marketplace. For each project that successfully leads to a practical application, many are undertaken that are unsuccessful. For each success in the marketplace, there may be as many as one hundred failures. The successes must yield enough in profits to provide an adequate return on the total investment in R&D, including the many projects that prove unsuccessful.

Spurred by international competition, chemical industry research and development spending steadily expanded in the 1980's, resulting in a larger number of patents granted.

Chart 4.1
U.S. Chemical Industry R+D Funding

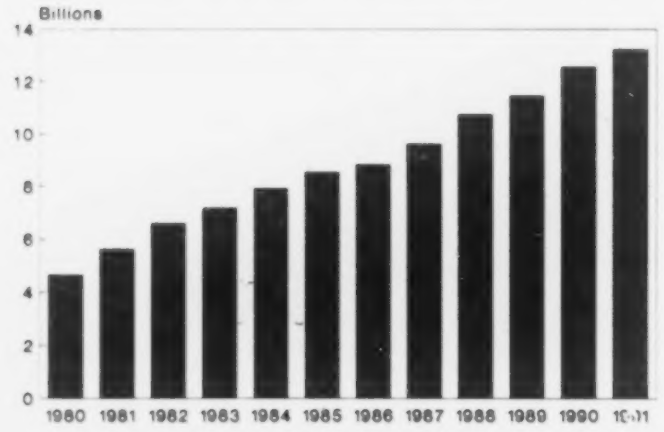
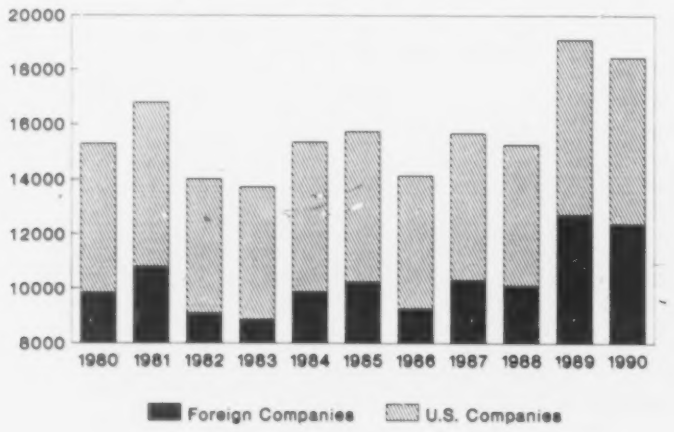


Chart 4.2
Chemicals U.S. Patent Trends



The 1991 level of chemical industry R+D spending was 3.1 times that of 1980. The chemical industry employs about 12.5% of the total scientists and engineers in the manufacturing sector. The patents trends shown above include registrations by foreign companies.

TABLE 4.1
RESEARCH & DEVELOPMENT FUNDING (MILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total R&D	26134	62583	71851	80001	89126	101116	113745	119863	127316	135231	142000	150000	154500	8.0%	5.2%	3.0%
Manufacturing	17362	42689	49904	56178	61931	69895	77525	80377	84311	60412	93568	95086	98425	7.0%	4.1%	3.5%
Company Funds	10063	29439	34380	38633	42504	48152	52642	55192	56259	29364	64942	67249	70675	7.5%	5.1%	5.1%
Federal Contracts	7299	13250	15524	17545	19427	21743	24883	25185	28052	29553	28626	27837	27750	6.0%	2.0%	-0.3%
Chemicals & Allied Products	1773	4636	5625	6604	7185	7927	8540	8843	9635	10772	11466	12565	13325	9.0%	8.5%	6.0%
Company Funds	1593	4264	5205	6197	6792	7736	8310	8664	9445	10573	11383	12498	13250	9.8%	8.9%	6.0%
Federal Contracts	180	372	421	407	393	191	230	179	190	199	83	67	75	-15.8%	-16.0%	11.9%

Source: National Science Foundation
1991 data are CMA estimates based on NSF data

TABLE 4.2
RESEARCH & DEVELOPMENT FUNDING AS A PERCENT OF SALES (%)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Manufacturing	n/a	3.0%	3.1%	3.8%	3.9%	3.9%	4.4%	4.7%	4.6%	4.7%	4.6%	4.6%	4.7%
Chemicals & Allied Products	n/a	3.6%	3.6%	4.3%	4.4%	4.7%	5.0%	5.2%	5.3%	5.4%	5.4%	5.7%	5.9%

Source: National Science Foundation
1991 data are CMA estimates based on NSF and Census Bureau data

TABLE 4.3
FULL-TIME EQUIVALENT R&D SCIENTISTS AND ENGINEERS (THOUSANDS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	n/a	449.4	476.6	498.3	531.3	553.5	580.0	609.1	605.8	612.5	622.5	618.0	599.5	2.3%	-0.3%	-3.0%
Chemicals & Allied Products	40.1	51.4	54.7	61.6	67.3	69.8	71.1	75.8	75.2	75.8	77.6	78.9	79.9	3.9%	1.1%	1.3%
Industrial Chemicals	21.5	20.9	21.6	25.9	26.6	25.6	23.5	24.9	22.4	22.5	23.1	23.0	23.3	0.8%	-1.3%	1.3%
Drugs and Medicines	11.8	21.6	23.3	25.6	28.2	30.8	30.8	31.8	32.6	33.0	34.0	33.5	34.5	4.0%	1.6%	3.0%
Other Chemicals	6.8	8.9	9.8	10.1	12.1	13.4	16.7	19.1	20.2	20.3	20.5	22.4	22.1	8.5%	3.0%	-1.3%

Source: National Science Foundation
1991 data are CMA estimates based on NSF data

TABLE 4.4
U.S. PATENTS GRANTED (NUMBER)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Manufacturing	64305	61810	65766	57882	56855	67186	71649	70778	82860	77799	95262	89982	n/a
By Nation:													
United States	46982	37351	39221	33891	32867	38354	39549	38078	43462	40416	50036	47195	n/a
Japan	2618	7124	8387	8149	8792	11109	12743	13198	16539	16137	20100	19444	n/a
West Germany	4429	5745	6250	5408	5423	6254	6665	6795	7815	7300	8286	7541	n/a
United Kingdom	2949	2406	2475	2134	1931	2271	2495	2408	2777	2581	3091	2778	n/a
France	1730	2088	2181	1975	1895	2162	2399	2365	2869	2655	3134	2854	n/a
Switzerland	1108	1265	1239	1147	1017	1174	1233	1208	1373	1244	1358	1281	n/a
Other Nations	4489	5831	6013	5178	4930	5862	6565	6726	8025	7466	9257	8889	n/a
Chemical & Allied Products	8803	9828	10793	9086	8850	9868	10238	9250	10296	10090	12/04	12377	n/a
By Nation:													
United States	5843	5462	6000	4933	4888	5500	5508	4896	5378	5176	6399	6072	n/a
West Germany	826	1163	1321	1114	1070	1135	1170	1144	1250	1274	1570	1539	n/a
Japan	528	1102	1279	1193	1193	1321	1563	1418	1600	1627	2063	2211	n/a
United Kingdom	369	518	540	422	380	479	466	392	431	476	566	563	n/a
France	278	393	425	381	349	367	433	370	428	406	528	532	n/a
Switzerland	348	348	354	319	288	295	290	252	276	283	329	329	n/a
Other Nations	611	842	874	724	682	771	808	778	933	848	1249	1131	n/a
By Segment:													
Industrial Inorganic Chemicals-	893	1103	1297	1020	1110	1183	1189	1052	1165	1034	1258	1159	n/a
Plastic Materials and Synthetics	1146	965	1089	925	1072	1053	1156	968	1116	1114	1374	1492	n/a
Drugs	498	1372	1422	1269	1112	1399	1401	1426	1750	1749	2367	2210	n/a
Soaps, Cleaners, and Toilet Goods	244	388	461	355	393	456	473	405	463	500	696	578	n/a
Paints and Allied Products	388	457	506	405	431	461	474	361	415	400	463	395	n/a
Industrial Organic Chemicals	4671	3894	4338	3495	3091	3453	3544	3249	3396	3281	4030	4144	n/a
Agricultural Chemicals	399	1121	1098	1046	996	1173	1248	1222	1354	1374	1870	1747	n/a
Miscellaneous Chemical Products	565	528	582	571	645	691	752	569	637	638	647	655	n/a

Source: Patent and Trademark Office

- The chemical industry received 14% of the U.S. patents granted in 1990. U.S. companies received 49% of the chemical industry patents granted in the United States in 1990, compared to 56 percent in 1980 and 54 percent in 1985.

Section 5
Investment In Plant and Equipment

The nature of chemical production, which lends itself to a high degree of automation, engenders prodigious capital requirements. These high capital costs reflect the large production capacity in individual plants often needed to obtain economies of scale in the production of many chemicals, the intricate nature of the equipment and processes used, the large amounts of equipment needed, the high level of technology required, and the rapid technological obsolescence and depreciation of process plants. Indeed, the amount of gross capital stocks per employee in the chemical industry - $176,500 in 1991 - was over twice that for U.S. manufacturing as a whole.

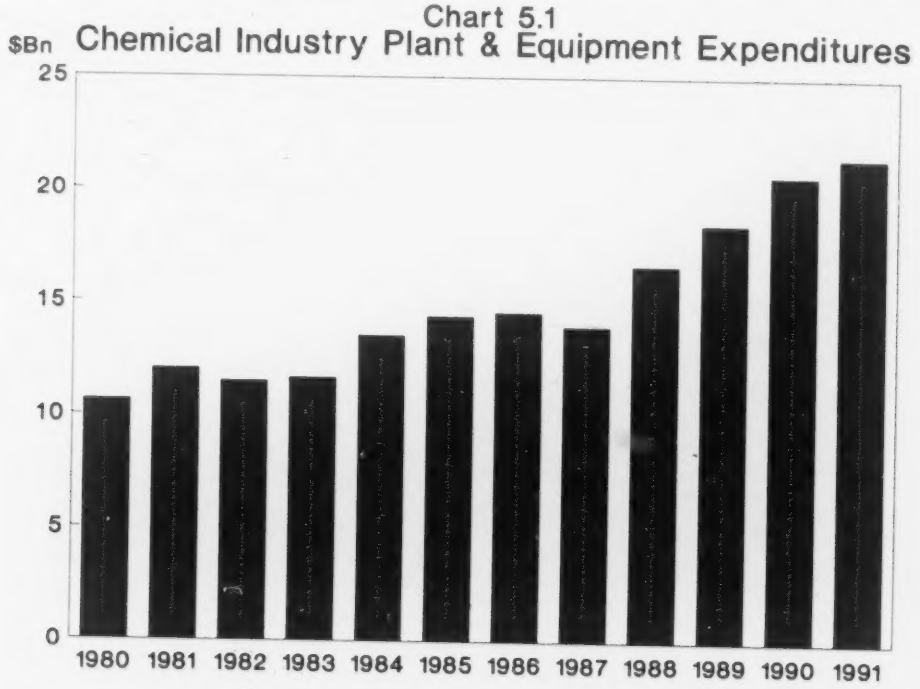
New capital needs include not only extensive investment for new capacity but also for continual upgrading and replacement of existing plants to remain competitive and to protect the environment. Complete modernization programs that utilize the latest process technologies, often for "debottlenecking" (i.e., maximizing throughput in an existing plant) are frequently necessary. A long lead time is required for funding, designing, and completing chemical industry capital spending programs. This makes short-run adjustments difficult as capital spending cannot easily be turned on and off. Given its capital intensive nature, however, the industry is highly sensitive to the costs of capital.

Most of the investment data in this section are on an "industry", or "establishment" basis that is, the investment data includes spending for fixed assets at the establishment (or facility) level. Since most facilities are dedicated to manufacturing a finite range of products, when investments by all establishments classified as chemicals are aggregated, the total will, for the most part, include only chemical assets.

Data on new plant & equipment expenditures, however, are also included in this section. These data are reported on a "company" basis which differs in concept from data reported on an industry basis. On the "company" basis, a company is classified to an industry based on its largest business segment. All of a company's spending would be classified in that industry, even if the largest segment accounted for 20 percent of revenues. The plant & equipment expenditures data collected by the Bureau of the Census are reported on a company basis and may include investments by chemical companies for non-chemical assets. These data may overstate capital investment related to chemical production. For this reason, the gross investment data developed by the Bureau of Economic Analysis may provide a more accurate picture in that it generally includes only investments for chemical assets, but reflects such investments by both chemical and non-chemical companies.

Following the recession of the early-1980's, chemical industry expenditures for plant & equipment -- including expenditures for upgrading existing facilities -- increased nearly 90 percent.

Chart 5.1



The nearly 90 percent increase in chemical industry plant and equipment expenditures between 1982 and 1991 outpaced all manufacturing by roughly 40 percentage points.

TABLE 5.1
NEW PLANT & EQUIPMENT EXPENDITURES IN THE UNITED STATES (COMPANY BASIS)
(BILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	36.99	112.60	128.68	123.97	117.35	139.61	152.88	137.95	141.06	163.45	183.80	192.61	183.61	3.6%	5.9%	-4.7%
Chemicals & Allied Products	3.38	10.62	11.99	11.44	11.59	13.46	14.35	14.54	13.92	16.62	18.47	20.63	21.45	6.0%	8.1%	4.0%

Source: Bureau of the Census (data are on a company basis)

TABLE 5.2
CAPITAL EXPENDITURES (PLANT & EQUIPMENT) ABROAD BY MAJORITY-OWNED AFFILIATES OF U.S. COMPANIES (COMPANY BASIS)
(BILLION DOLLARS)*

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	n/a	19.54	19.16	16.65	13.56	13.62	14.92	16.39	17.16	20.40	23.82	29.35	28.20	3.9%	11.5%	-3.9%
Chemicals & Allied Products	n/a	2.97	2.97	3.35	2.32	2.39	2.74	3.06	3.74	4.71	5.29	6.75	6.52	8.2%	16.3%	-3.4%

* Data series begin in 1977
Source: Bureau of Economic Analysis (data are on a company basis)

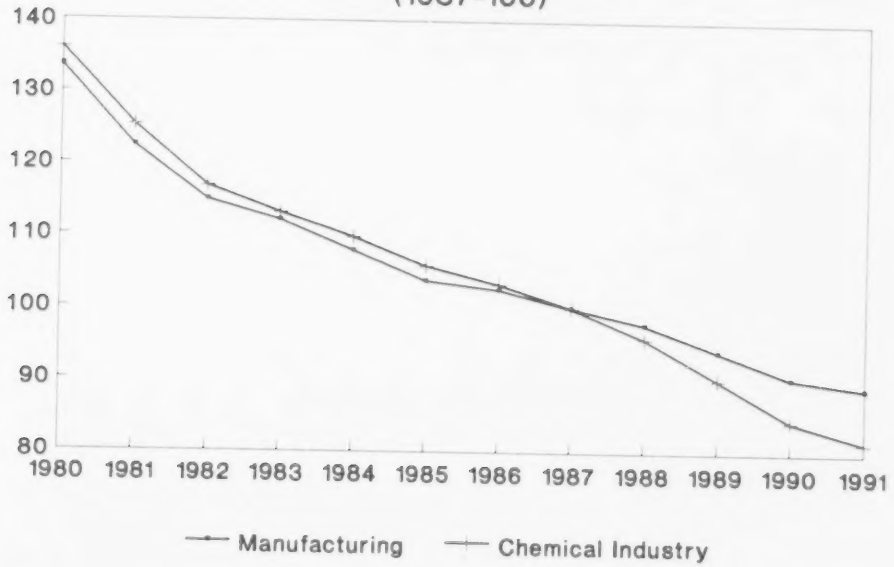
TABLE 5.3
GROSS INVESTMENT (ESTABLISHMENT BASIS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Gross Investment (million dollars)																
Manufacturing	24260	79512	92878	89201	71484	86120	97719	86125	95492	98112	117778	126035	113760	2.0%	5.7%	-9.7%
Chemicals & Allied Products	3325	10824	11805	11619	9153	9927	10851	10179	11887	14558	18328	20851	19133	4.9%	13.5%	-8.2%
Gross Investment (million 1987 dollars)																
Manufacturing	71403	102692	108587	98377	77061	90693	102109	87663	95492	95502	112153	117894	104327	-0.4%	3.5%	-11.5%
Chemicals & Allied Products	9761	14188	14098	13076	10073	10560	11483	10420	11887	14110	17221	19073	16940	1.9%	10.2%	-11.2%

Source: Bureau of Economic Analysis (data are on an establishment basis)

Reflecting higher construction costs and mandated expenditures for pollution abatement and control, the productivity of capital declined during the 1980's.

Chart 5.2
Capital Productivity
(1987=100)



Capital productivity, or the productivity of net fixed investment, is herein defined as capacity divided by net capital stocks and indexed where 1987=100. This measure indicates how much exisiting facilities could produce if they were fully utilized. After steadily increasing during the 1950's and 1960's, largely because of technological progress, capital productivity began to decline in the 1970's. Higher plant construction costs and mandated environmental expenditures largely account for the decline, which has slowed slightly during the past five years, but is more pronounced in the chemical industry than for manufacturing as a whole, declining from 100 in 1987 to 81.5 in 1991 compared to manufacturing's decline to 89.0.

TABLE 5.4
CHEMICAL INDUSTRY GROSS INVESTMENT BY TYPE OF ASSET (ESTABLISHMENT BASIS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
In Millions of Dollars																
Total Gross Investment	3325	10824	11805	11619	9153	9827	10851	10179	11887	14558	18328	20851	19133	4.9%	13.5%	-8.2%
Producers Durable Equipment	2466	7593	8675	8216	6291	6808	7225	7065	8052	10293	12783	14878	13552	4.6%	13.9%	-8.9%
Traditional Process Equipment	2044	4341	4795	4391	3504	3665	3535	3645	3865	5129	6125	7046	6711	3.4%	13.0%	-4.8%
Information Processing Equipmen	358	2966	3475	3391	2393	2642	3023	2857	3524	4316	5611	6763	5905	5.4%	15.6%	-12.7%
Other Equipment	64	286	405	434	394	501	667	563	663	848	1047	1069	936	8.7%	10.7%	-12.4%
Buildings and Structures	859	3231	3130	3403	2862	3019	3626	3114	3835	4265	5545	5973	5581	6.0%	12.4%	-6.6%
In Millions of 1987 Dollars																
Total Gross Investment	9761	14188	14098	13076	10073	10560	11483	10420	11887	14110	17221	19073	16940	1.9%	10.2%	-11.2%
Producers Durable Equipment	6995	9753	10162	9035	6783	7225	7626	7203	8052	10005	12076	13687	11970	1.7%	10.7%	-12.5%
Traditional Process Equipment	6295	5994	5915	4989	3875	3975	3785	3748	3865	4921	5636	6255	5660	-0.4%	8.6%	-9.5%
Information Processing Equipmen	541	3405	3786	3571	2487	2741	3166	2916	3524	4286	5477	6455	5606	4.0%	14.0%	-13.2%
Other Equipment	159	354	461	475	421	509	675	539	663	798	963	977	704	4.3%	5.5%	-27.9%
Buildings and Structures	2766	4435	3936	4041	3290	3335	3857	3217	3835	4105	5145	5386	4970	2.4%	9.1%	-7.7%

Source: Bureau of Economic Analysis (data are on an establishment basis)

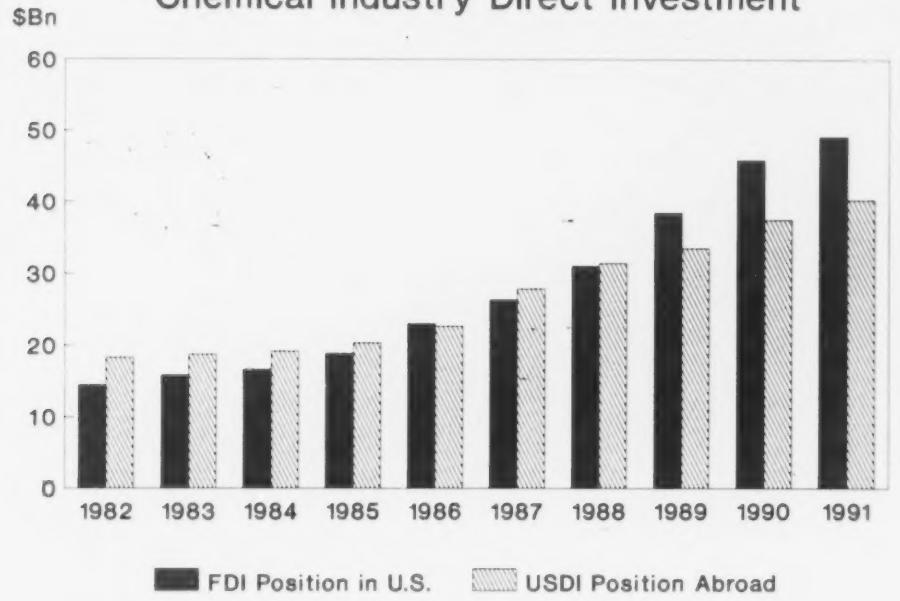
TABLE 5.5
CAPITAL STOCKS AND PRODUCTIVITY

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Gross Capital Stocks (billion dollars)																
Manufacturing	253.33	628.32	706.81	779.82	833.14	899.03	973.62	1034.02	1100.71	1167.26	1250.86	1339.98	1414.00	7.2%	6.5%	5.5%
Chemicals & Allied Products	31.69	87.31	97.05	106.22	112.48	119.09	126.33	132.53	140.06	149.90	163.18	178.71	192.26	7.1%	7.7%	7.6%
Net Capital Stocks (billion dollars)																
Manufacturing	163.56	421.44	477.59	525.60	552.36	590.91	636.94	667.59	704.31	740.23	791.78	847.08	885.93	6.4%	5.8%	4.6%
Chemicals & Allied Products	20.43	58.73	65.09	70.68	73.38	76.51	80.31	83.12	87.32	93.77	103.34	114.63	123.37	6.6%	8.2%	7.6%
Gross Capital Stocks (billion 1987 dollars)																
Manufacturing	1001.12	1480.72	1542.52	1590.49	1614.50	1650.22	1694.15	1721.23	1752.64	1781.89	1825.94	1873.27	1904.42	2.1%	2.0%	1.7%
Chemicals & Allied Products	119.46	192.11	199.93	205.98	208.28	210.85	213.88	215.45	218.10	222.62	230.10	239.35	246.44	2.1%	2.7%	3.0%
Net Capital Stocks (billion 1987 dollars)																
Manufacturing	598.54	860.36	895.38	917.37	916.41	928.43	949.53	954.08	964.30	973.36	996.71	1022.93	1033.04	1.4%	1.6%	1.0%
Chemicals & Allied Products	72.53	113.67	117.35	119.56	118.57	118.17	118.62	117.94	118.68	121.53	127.16	134.16	138.64	1.7%	3.3%	3.3%
Capacity (Percent of 1987 Output)																
Manufacturing	70.9	98.2	101.9	105.2	107.9	111.1	115.2	119.3	122.8	126.1	129.8	133.5	137.5	3.0%	2.9%	3.0%
Chemicals & Allied Products	71.8	111.7	113.9	115.3	115.9	117.2	118.6	119.8	122.0	125.5	130.1	135.2	140.4	2.1%	3.2%	3.8%
Capital Productivity (1987=100) *																
Manufacturing	248.6	133.6	122.4	114.8	112.0	107.8	103.7	102.5	100.0	97.7	94.0	90.4	89.0	-3.1%	-2.8%	-1.5%
Chemicals & Allied Products	251.5	136.1	125.3	116.8	113.1	109.7	105.7	103.2	100.0	95.8	90.1	84.4	81.5	-4.2%	-4.6%	-3.4%

Source: Bureau of Economic Analysis, Federal Reserve Board, CMA analysis (data are on an establishment basis)
* Capital productivity (or the productivity of net fixed investment) is defined as capacity divided by net capital stocks in current dollars and indexed where 1987=100.

Since the early-1980's, the U.S. chemical industry has become more global in scope.

Chart 5.3
Chemical Industry Direct Investment



Foreign direct investment is the ownership of 10 percent or more of the voting stock or equity in a foreign company. Foreign direct investment in the U.S. chemical industry more than doubled between 1985 and 1991. Europeans were the dominant investors in U.S. chemicals. U.S. chemical industry investments abroad also grew substantially, around 58 percent of new U.S. chemical industry investment abroad went to Europe. At end 1991, the book value of foreign direct investment in the U.S. chemical industry was $49.1 billion and U.S. investment in foreign chemical industries was $40 billion.

TABLE 5.6
INTERNATIONAL DIRECT INVESTMENT (BILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/86	1991/90
Foreign Direct Investment in the United States (FDIUS)															
Position:															
Manufacturing	n/a	n/a	n/a	44.07	47.67	51.80	59.58	71.96	93.87	122.58	150.95	157.43	162.85	17.7%	3.4%
Chemicals & Allied Products	n/a	n/a	n/a	14.38	15.78	16.63	18.84	22.95	26.29	30.93	38.41	45.85	49.13	16.4%	7.2%
Capital Inflows:															
Manufacturing	n/a	n/a	n/a	2.74	3.54	3.99	8.05	11.87	25.02	31.92	38.60	16.66	6.62	-11.0%	-60.3%
Chemicals & Allied Products	n/a	n/a	n/a	0.68	1.39	0.83	1.95	4.11	7.04	5.75	13.34	7.87	3.72	-1.9%	-52.7%
Income:															
Manufacturing	n/a	n/a	n/a	0.04	0.82	2.44	0.20	0.08	4.83	6.21	5.50	3.31	0.92	65.0%	-72.3%
Chemicals & Allied Products	n/a	n/a	n/a	0.25	0.52	0.82	0.49	0.52	1.92	2.85	2.87	4.35	2.75	39.6%	-36.9%
Royalties and License Fees:															
Manufacturing	n/a	n/a	n/a	0.16	0.20	0.28	0.26	0.32	0.66	0.70	0.94	1.14	1.62	38.1%	42.6%
Chemicals & Allied Products	n/a	n/a	n/a	0.11	0.10	0.14	0.16	0.20	0.36	0.43	0.58	0.61	0.99	38.0%	62.7%
Charges for Other Services:															
Manufacturing	n/a	n/a	n/a	0.12	0.04	0.23	0.35	-0.06	0.36	0.29	0.34	0.14	0.04		-69.1%
Chemicals & Allied Products	n/a	n/a	n/a	0.05	-0.06	-0.06	-0.01	0.03	0.04	0.04	-0.05	0.08	0.10	29.6%	20.3%
U.S. Direct Investment Position Abroad (USDIA)															
Position:															
Manufacturing	n/a	n/a	n/a	83.45	82.91	85.87	94.70	105.10	131.65	138.73	144.68	164.47	175.41	10.8%	6.7%
Chemicals & Allied Products	n/a	n/a	n/a	18.27	18.79	19.20	20.27	22.65	27.79	31.37	33.49	37.43	40.23	12.2%	7.5%
Capital Inflows:															
Manufacturing	n/a	n/a	n/a	4.06	2.86	6.73	5.57	5.86	12.65	8.08	13.34	11.14	12.31	16.0%	10.5%
Chemicals & Allied Products	n/a	n/a	n/a	0.79	0.78	1.30	0.62	1.60	2.97	3.92	3.67	2.47	3.28	15.5%	33.1%
Income:															
Manufacturing	n/a	n/a	n/a	6.42	8.22	10.71	11.21	13.83	18.62	25.96	26.39	23.65	18.65	6.2%	-21.1%
Chemicals & Allied Products	n/a	n/a	n/a	1.38	1.78	2.26	2.15	3.57	4.23	6.31	6.01	5.55	5.37	8.5%	-3.2%
Royalties and License Fees:															
Manufacturing	n/a	n/a	n/a	2.74	2.83	3.05	3.18	4.09	5.44	6.44	7.03	8.65	9.17	17.5%	6.0%
Chemicals & Allied Products	n/a	n/a	n/a	0.63	0.63	0.68	0.67	0.77	0.97	1.33	1.40	1.76	1.96	20.7%	11.3%
Charges for Other Services:															
Manufacturing	n/a	n/a	n/a	1.05	1.12	1.18	1.23	1.36	1.12	1.22	2.16	2.03	1.67	4.2%	-17.9%
Chemicals & Allied Products	n/a	n/a	n/a	0.26	0.31	0.28	0.31	0.31	0.32	0.39	0.44	0.50	0.58	13.4%	14.8%

* Data series begin in 1982
Source: Bureau of Economic Analysis (data are on a historical or book value basis)

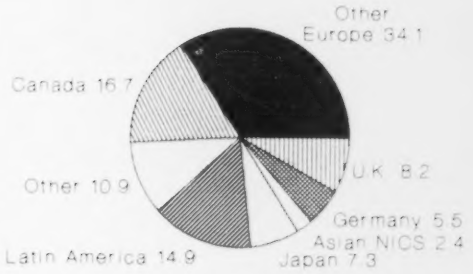
The bulk of foreign direct investment in the United States (FDIUS) is from European nations. Similarly, the great majority of U.S. direct investment abroad (USDIA) is in Europe.

Chart 5.4
Composition of U.S. Chemical Industry
Direct Investment, 1991
(percent of total)

USDIA

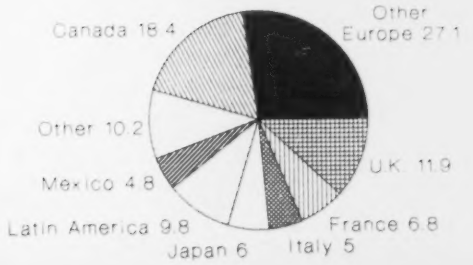
Chemicals

($40.2 Bn)



Manufacturing

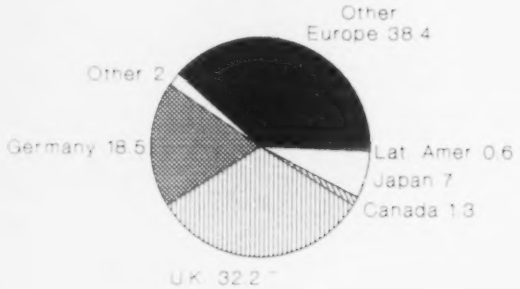
($175.4 Bn)



FDIUS

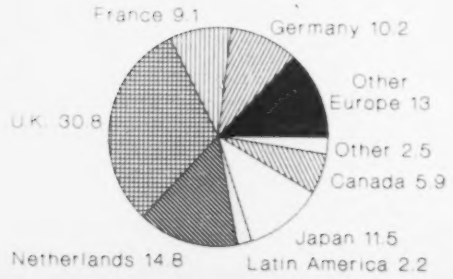
Chemicals

($49.1 Bn)



Manufacturing

($162.9 Bn)



Section 6
Employment and Labor

The chemical industry is one of the manufacturing sectors' most intensive consumers of capital and energy and one of the least intensive users of labor. Gross capital stocks per employee in the chemical industry — $176,500 in 1991 — are among the highest in American manufacturing (which averaged $76,700 per employee in 1991). Employing 1,089,600 workers in 1991, the chemical industry is nonetheless, one of the largest U.S. industries in terms of employment. Since World War II, growth in the chemical industry has been accompanied by expanding employment and significant gains in labor productivity (i.e., output per manhour).

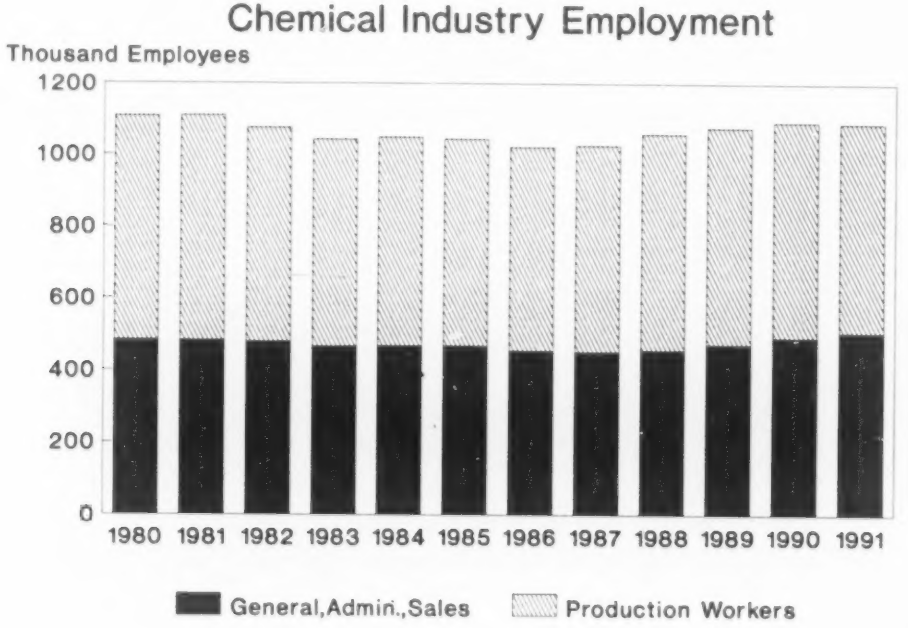
Because of the highly varied and technical nature of its operations and products, research and development (R&D) and technical servicing provided to customers is critical. This, together with continuing increases in the automation of production processes, has caused the production worker's portion of the industry workforce to decline modestly over the years. Production worker employment was 584,500 in 1991, 54 percent of the total (as compared with 68 percent for manufacturing as a whole).

Thus, more than four out of every ten employees in chemicals are in administration, sales, technical servicing, R&D, and clerical positions. The industry employs nearly 80,000 scientists and engineers in R&D alone. This represents about 7 percent of total chemical industry employment and over 12 percent of total R&D employment of scientists and engineers by the manufacturing sector in the United States.

The increasingly complex nature of the chemical industry requires new and more highly developed skills, and better trained and educated workers. In plant operations, this has resulted in making technicians out of skilled workers and skilled workers out of unskilled workers. In other areas, the need for chemists, chemical engineers, and other technically trained personnel (from agronomists to toxicologists to zoologists) continues to mount. The need for more technical production line skills and the increasing productivity of chemical industry workers has resulted in the chemical industry paying hourly production wages that are 25 percent to 30 percent greater than those paid by manufacturing as a whole.

After a long period of restructuring, employment in the U.S. chemical industry increased steadily after 1986, but returned by 1990 to 1.1 million, only marginally below the 1981 all-time peak levels.

Chart 6.1



Chemical industry employment rose 6.6 percent between 1986 and 1991 to 1.1 million. Pharmaceuticals added 39,500 jobs during this period. Plastic materials and synthetics added 11,000 and soap, cleaners, and toilet goods, increased employment by 9,800.

TABLE 6.1
EMPLOYMENT (THOUSANDS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Nonfarm	70880	90406	91156	89566	90200	94496	97519	99525	102200	105536	108329	109782	108310	1.7%	1.7%	-1.3%
Total Private Nonfarm	58325	74166	75126	73729	74330	78472	81125	82832	85187	88145	90545	91482	89932	1.8%	1.7%	-1.7%
Manufacturing	19366	20285	20170	18780	18433	19378	19259	18964	19024	19349	19441	19117	18455	-0.9%	-0.5%	-3.5%
Chemicals & Allied Products	1049.3	1107.4	1108.9	1075.1	1042.7	1049.3	1044.1	1021.7	1025.8	1059.0	1076.1	1087.6	1072.4	-0.3%	1.0%	-1.4%
Industrial Inorganic Chemicals	n/a	161.3	162.1	161.0	150.8	143.0	142.5	135.4	130.6	132.6	135.0	138.0	126.1	-2.5%	-1.4%	-8.6%
Plastics Materials and Synthetics	232.5	204.8	196.0	184.7	176.5	177.8	172.1	167.6	168.2	177.0	182.3	180.5	177.4	-1.0%	1.1%	-1.7%
Drugs	148.9	196.1	199.0	198.8	201.3	205.9	205.7	207.6	215.2	227.8	232.2	237.3	245.2	2.1%	3.4%	3.3%
Soap, Cleaners, and Toilet Goods	127.0	140.9	146.0	143.9	142.2	145.5	147.7	146.7	152.7	159.7	160.5	159.8	156.0	0.7%	1.2%	-2.4%
Paints and Allied Products	69.9	65.1	63.4	59.9	59.7	62.0	63.5	62.9	62.6	63.3	62.5	61.2	57.9	-0.9%	-1.6%	-5.4%
Industrial Organic Chemicals	n/a	173.9	177.6	170.6	162.9	162.2	159.9	154.2	148.1	146.0	150.2	154.9	155.2	-1.3%	0.1%	0.2%
Agricultural Chemicals	n/a	72.0	70.4	65.3	60.5	60.6	58.8	54.0	51.4	51.9	53.7	55.8	56.2	-2.2%	0.8%	0.7%
Miscellaneous Chemical Products	n/a	93.3	94.4	91.0	89.0	92.3	94.2	93.6	96.9	100.6	99.8	99.9	98.4	0.4%	1.0%	-1.5%

Source: Bureau of Labor Statistics

TABLE 6.2
EMPLOYMENT-PRODUCTION WORKERS (THOUSANDS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	14045	14214	14020	12742	12530	13285	13092	12877	12970	13221	13269	12979	12467	-1.2%	-0.6%	-3.9%
Chemicals & Allied Products	604.0	625.8	628.3	598.6	578.6	583.0	577.8	568.0	575.3	597.0	604.6	600.7	579.0	-0.8%	0.4%	-3.6%
Industrial Inorganic Chemicals	n/a	87.5	88.4	85.7	77.0	72.8	72.2	69.3	67.2	68.5	70.2	70.3	62.4	-3.4%	-2.0%	-11.2%
Plastics Materials and Synthetics	142.9	136.6	129.7	119.3	114.6	117.3	114.4	112.7	110.9	115.8	118.9	116.3	110.1	-1.6%	-0.5%	-5.3%
Drugs	72.6	96.7	99.4	98.2	98.2	96.2	94.8	96.0	98.7	101.0	101.9	105.3	108.3	0.9%	2.4%	2.9%
Soap, Cleaners, and Toilet Goods	72.9	85.8	91.6	90.2	89.1	92.6	93.5	92.8	97.5	102.7	101.2	98.6	95.6	0.4%	0.6%	-3.0%
Paints and Allied Products	39.1	32.9	31.3	28.9	29.2	30.4	30.6	30.3	30.7	31.3	31.6	31.0	29.5	-0.6%	-0.5%	-4.9%
Industrial Organic Chemicals	n/a	88.1	89.6	85.8	83.6	82.4	81.5	81.2	83.1	86.3	87.8	85.9	80.8	-1.0%	-0.1%	-6.0%
Agricultural Chemicals	n/a	45.4	44.0	39.6	36.5	37.5	36.6	33.1	32.3	33.2	33.6	34.3	34.0	-2.5%	0.5%	-0.9%
Miscellaneous Chemical Products	n/a	52.8	54.3	50.9	50.5	53.7	54.2	52.6	54.9	58.2	59.4	59.1	58.3	0.7%	2.1%	-1.4%

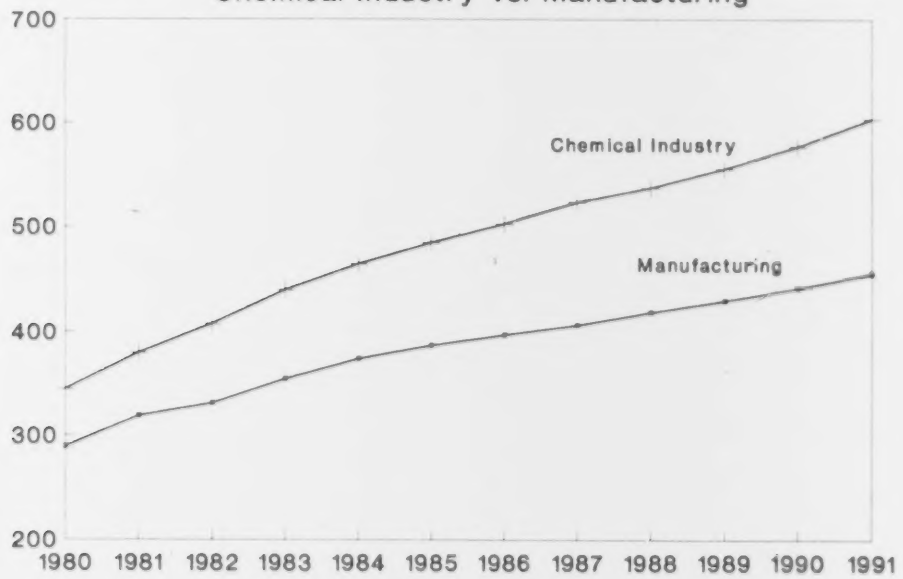
Source: Bureau of Labor Statistics

Weekly earnings in the chemical industry have been consistently above those in Manufacturing as a whole.

Chart 6.2

Weekly Earnings

Chemical Industry vs. Manufacturing



Average weekly earnings for chemical production workers increased by an average of 4.5 percent per year between 1982 and 1991. Manufacturing workers weekly pay increased by an average of 3.6 percent per year. During the same period consumer prices increased by an average of 4.1 percent per year.

TABLE 6.3
AVERAGE HOURLY EARNINGS-PRODUCTION WORKERS ($/HOUR)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Private Nonfarm	3.23	6.66	7.25	7.68	8.02	8.32	8.57	8.76	8.98	9.28	9.65	10.01	10.33	3.6%	3.4%	3.2%
Manufacturing	3.35	7.28	7.99	8.50	8.83	9.19	9.54	9.73	9.91	10.19	10.48	10.83	11.18	3.4%	2.8%	3.2%
Chemicals & Allied Products	3.69	8.31	9.12	9.97	10.58	11.07	11.57	11.97	12.36	12.71	13.09	13.54	14.02	4.4%	3.2%	3.5%
Industrial Inorganic Chemicals	n/a	9.08	10.16	11.02	11.66	12.30	12.80	13.11	13.56	13.83	14.20	14.66	15.03	4.0%	2.8%	2.5%
Plastics Materials and Synthetics	3.62	8.21	9.01	9.88	10.55	11.10	11.72	12.13	12.60	13.06	13.43	13.97	14.78	5.1%	4.0%	5.8%
Drugs	3.54	7.69	8.29	9.08	9.71	10.23	10.75	11.15	11.62	12.07	12.52	12.90	13.46	5.0%	3.8%	4.3%
Soap, Cleaners, and Toilet Goods	3.64	7.67	8.38	9.12	9.64	9.90	10.28	10.76	10.90	11.05	11.26	11.71	12.03	3.7%	2.3%	2.7%
Paints and Allied Products	3.47	7.39	8.03	8.80	9.33	9.75	10.08	10.44	10.84	11.24	11.67	11.99	12.47	4.5%	3.6%	4.0%
Industrial Organic Chemicals	n/a	9.67	10.71	11.85	12.73	13.43	13.98	14.39	14.89	15.30	15.65	15.97	16.53	4.4%	2.8%	3.5%
Agricultural Chemicals	n/a	8.13	8.91	9.71	10.25	10.74	11.05	11.45	11.92	12.36	12.84	13.74	14.18	4.8%	4.4%	3.2%
Miscellaneous Chemical Products	n/a	7.75	8.44	9.22	9.62	10.09	10.61	11.07	11.36	11.53	11.91	12.28	12.61	4.1%	2.6%	2.7%

Source: Bureau of Labor Statistics

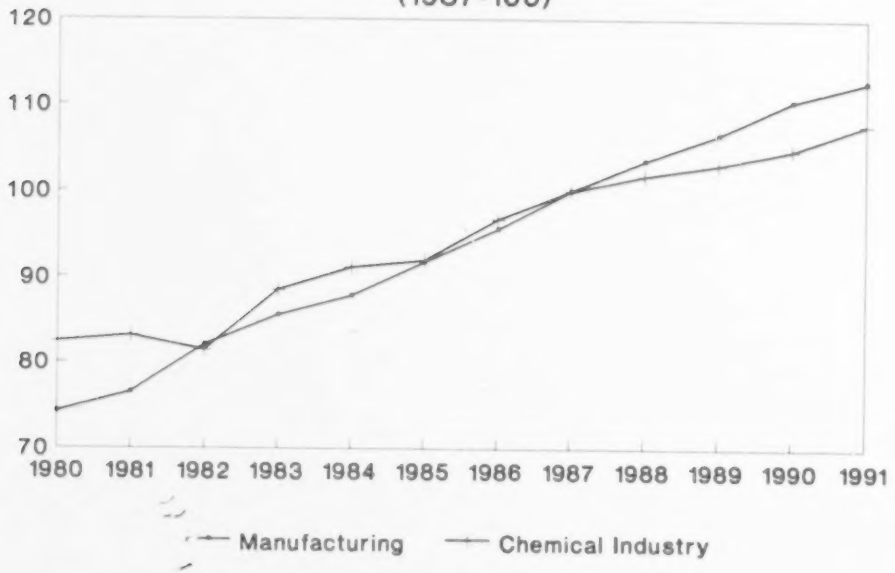
TABLE 6.4
AVERAGE WEEKLY EARNINGS-PRODUCTION WORKERS ($/WEEK)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Private Nonfarm	119.75	234.81	255.39	267.14	280.62	292.43	299.09	304.52	312.35	321.83	333.59	345.24	354.27	3.3%	3.1%	2.6%
Manufacturing	133.54	288.88	318.10	330.83	354.05	373.79	386.48	396.56	406.08	418.61	429.44	441.38	454.92	3.6%	2.8%	3.1%
Chemicals & Allied Products	153.52	344.43	379.24	407.50	439.96	464.07	484.62	502.17	523.18	537.09	555.44	576.81	601.17	4.7%	3.7%	4.2%
Industrial Inorganic Chemicals	n/a	376.59	422.14	445.67	484.04	518.16	533.38	551.26	575.01	590.55	606.11	629.81	656.07	4.5%	3.5%	4.2%
Plastics Materials and Synthetics	151.37	339.69	378.57	401.48	442.87	468.63	495.47	511.46	542.63	567.09	579.02	593.87	630.85	5.2%	4.3%	6.2%
Drugs	143.54	315.50	340.51	373.14	398.78	416.13	441.38	463.69	483.41	496.50	522.16	538.85	572.86	5.3%	4.3%	6.3%
Soap, Cleaners, and Toilet Goods	149.50	310.28	338.77	370.57	396.40	408.91	421.78	441.76	447.99	444.29	452.27	477.38	491.44	3.8%	2.2%	2.9%
Paints and Allied Products	140.83	297.80	324.36	348.13	382.27	406.57	417.53	433.73	451.58	471.53	487.78	503.78	525.75	4.9%	3.9%	4.4%
Industrial Organic Chemicals	n/a	413.86	458.65	496.62	540.45	578.14	605.93	624.45	655.97	670.27	698.43	721.76	754.22	5.1%	3.8%	4.5%
Agricultural Chemicals	n/a	352.61	382.90	407.86	431.26	459.28	471.90	482.67	510.67	535.76	557.07	605.03	629.69	5.1%	5.5%	4.1%
Miscellaneous Chemical Products	n/a	317.78	348.54	373.45	397.33	421.57	443.80	457.77	470.82	485.30	504.79	520.80	533.58	4.4%	3.1%	2.5%

Source: Bureau of Labor Statistics

Labor productivity in the U.S. chemical industry has improved significantly since 1980.

Chart 6.3
Labor Productivity
(1987=100)



Labor productivity in the chemical industry rose by an average of 2.6 percent per year from 1981 to 1991, slightly below the 4.0 manufacturing average.

TABLE 6.5
AVERAGE WEEKLY HOURS-PRODUCTION WORKERS (HOURS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Private Nonfarm	37.1	35.3	35.2	34.8	35.0	35.2	34.9	34.8	34.8	34.7	34.6	34.5	34.3	-0.3%	-0.3%	-0.6%
Manufacturing	39.8	39.7	39.8	38.9	40.1	40.7	40.5	40.7	41.0	41.1	41.0	40.8	40.7	0.2%	0.0%	-0.1%
Chemicals & Allied Products	41.6	41.5	41.6	40.9	41.6	41.9	41.9	41.9	42.3	42.3	42.4	42.6	42.9	0.3%	0.4%	0.7%
Industrial Inorganic Chemicals	n/a	41.5	41.6	40.5	41.5	42.1	41.7	42.1	42.4	42.7	42.7	42.9	43.6	0.5%	0.7%	1.6%
Plastics Materials and Synthetics	41.8	41.4	42.0	40.6	42.0	42.2	42.3	42.2	43.1	43.4	43.1	42.5	42.7	0.2%	0.3%	0.5%
Drugs	40.5	41.0	41.1	41.1	41.1	40.7	41.0	41.6	41.6	41.1	41.7	41.8	42.5	0.3%	0.4%	1.7%
Soap, Cleaners, and Toilet Goods	41.0	40.5	40.4	40.6	41.1	41.3	41.0	41.1	41.1	40.2	40.1	40.8	40.9	0.1%	-0.1%	0.3%
Paints and Allied Products	40.5	40.3	40.4	39.6	41.0	41.7	41.4	41.6	41.7	41.9	41.8	41.9	41.8	0.3%	0.1%	-0.2%
Industrial Organic Chemicals	n/a	42.8	42.8	41.9	42.4	43.0	43.3	43.4	44.1	43.8	44.6	45.2	45.6	0.6%	1.0%	1.0%
Agricultural Chemicals	n/a	43.4	43.0	42.0	42.1	42.8	42.7	42.2	42.8	43.3	43.4	44.0	44.4	0.3%	1.0%	0.9%
Miscellaneous Chemical Products	n/a	41.0	41.3	40.5	41.3	41.8	41.8	41.3	41.5	42.1	42.4	42.4	42.3	0.2%	0.5%	-0.3%

Source: Bureau of Labor Statistics

TABLE 6.6
LABOR PRODUCTIVITY INDEX (1987=100)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Private Nonfarm	81.8	91.4	93.1	92.3	94.5	96.5	97.2	99.3	100.0	100.8	99.9	99.8	100.1	0.7%	0.2%	0.3%
Manufacturing	53.6	74.2	76.5	82.0	85.5	87.8	91.7	95.3	100.0	103.5	106.4	110.4	112.5	3.9%	3.3%	1.9%
Chemicals & Allied Products	54.2	82.4	83.1	81.4	88.5	91.1	91.9	96.7	100.0	101.7	103.0	105.0	108.8	2.7%	2.4%	3.6%
Industrial Inorganic Chemicals	n/a	75.8	75.2	71.1	82.1	90.0	91.1	93.1	100.0	95.7	101.4	102.6	117.1	4.5%	4.7%	14.1%
Plastics Materials and Synthetics	31.6	60.2	69.7	70.7	83.7	85.7	85.8	92.1	100.0	99.2	96.0	102.9	110.3	4.7%	3.7%	7.2%
Drugs	64.1	83.0	81.3	84.1	87.6	91.2	93.4	99.4	100.0	105.9	104.5	106.4	108.7	2.9%	1.8%	2.2%
Soap, Cleaners, and Toilet Goods	91.1	119.4	105.7	97.5	99.9	94.8	95.3	101.6	100.0	104.6	109.5	111.8	110.4	0.4%	1.7%	-1.3%
Paints and Allied Products	65.8	84.1	85.1	88.1	90.7	92.7	96.6	99.2	100.0	101.2	101.4	97.9	94.4	1.0%	-1.0%	-3.6%
Industrial Organic Chemicals	n/a	90.1	92.6	82.5	92.8	96.4	97.6	98.8	100.0	99.8	102.1	101.1	101.9	1.0%	0.6%	0.8%
Agricultural Chemicals	n/a	68.3	74.8	73.8	78.8	87.9	85.0	87.6	100.0	103.0	102.7	96.3	96.5	2.6%	2.0%	0.2%
Miscellaneous Chemical Products	n/a	84.3	82.2	91.3	94.2	88.1	88.8	101.3	100.0	99.8	97.8	103.6	112.7	3.2%	2.2%	8.8%

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

TABLE 6.7
UNIT LABOR COSTS (1987=100)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Private Nonfarm	37.1	76.0	81.8	88.7	90.1	91.7	94.7	97.4	100.0	103.2	107.7	113.4	117.6
Manufacturing	63.1	99.0	105.5	104.5	104.1	105.6	104.9	102.8	100.0	99.3	99.4	99.0	100.3
Chemicals & Allied Products	55.1	81.6	88.8	99.1	96.6	98.3	101.8	100.2	100.0	101.1	102.8	104.3	104.3
Industrial Inorganic Chemicals	n/a	88.3	99.6	114.2	104.7	100.8	103.6	103.9	100.0	106.5	103.2	105.5	94.7
Plastics Materials and Synthetics	91.1	108.3	102.6	110.8	100.0	102.8	108.4	104.5	100.0	104.5	111.0	107.8	106.4
Drugs	47.6	79.7	87.8	92.9	95.4	96.6	99.1	96.6	100.0	98.1	103.2	104.4	106.6
Soap, Cleaners, and Toilet Goods	36.7	58.9	72.7	85.8	88.5	95.7	98.9	97.1	100.0	96.9	94.4	96.0	99.9
Paints and Allied Products	48.8	81.1	87.0	92.1	94.9	97.1	96.3	97.0	100.0	102.4	106.1	112.9	122.0
Industrial Organic Chemicals	n/a	72.1	77.7	96.5	92.1	93.6	96.2	97.8	100.0	102.9	102.9	106.2	108.9
Agricultural Chemicals	n/a	99.8	99.9	110.4	109.1	102.4	109.0	109.6	100.0	100.7	104.8	119.6	123.3
Miscellaneous Chemical Products	n/a	80.9	90.5	88.9	90.0	100.7	105.1	96.3	100.0	101.8	107.2	104.3	98.6

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

TABLE 6.8
MANUFACTURING LABOR PRODUCTIVITY BY NATION (1982=100)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
United States	77.2	94.4	96.4	100.0	102.9	105.6	108.0	112.6	117.2	122.0	122.5	125.7	127.5
Canada	76.9	99.9	104.8	100.0	107.3	116.3	119.8	117.9	119.0	119.6	120.2	121.8	n/a
Japan	52.0	92.1	95.5	100.0	101.9	106.1	112.0	110.3	119.4	126.6	133.1	138.0	n/a
Belgium	44.3	87.5	94.2	100.0	110.2	114.6	116.4	117.8	123.0	129.8	134.9	140.5	n/a
Denmark	57.2	98.0	99.6	100.0	104.9	104.3	105.0	98.9	98.4	100.4	103.1	105.5	n/a
France	58.5	90.6	93.4	100.0	102.5	104.5	108.8	110.8	113.0	120.6	126.4	127.7	n/a
Germany	67.0	98.4	100.4	100.0	105.3	108.9	112.9	113.4	111.5	115.4	120.7	126.2	n/a
Italy	54.6	95.5	97.8	100.0	105.2	115.7	122.3	123.7	127.2	130.5	134.5	138.8	n/a
Netherlands	52.9	93.9	97.5	100.0	106.6	115.0	118.7	119.1	118.7	123.4	126.9	129.4	n/a
Norway	74.5	96.3	96.5	100.0	105.2	112.6	116.0	114.6	120.4	119.7	124.2	127.1	n/a
Sweden	69.1	96.4	95.8	100.0	106.5	111.9	112.6	114.3	115.7	117.3	117.6	118.2	n/a
United Kingdom	70.8	89.9	94.5	100.0	108.4	114.0	117.8	122.6	130.1	137.2	143.8	145.0	n/a

Source: Bureau of Labor Statistics
Note: These data differ in concept than those published in Table 6.6

o From 1982 to 1990, U.S. manufacturing productivity grew significantly, by 25.7 percent. The rate of growth however exceeded that of only 3 of 11 other industrialized countries for which comparable data is available.

Section 7
Health, Safety, and Environmental

In recent years there have been major advances in protecting the nation's environment and the health and safety of workers. Pollution of the air, water, and land has been declining even while production has been increasing, and many steps have been taken to improve worker health and safety.

In part these advances stem from a large number of federal and state laws and the implementing rules and regulations that set standards for government, industry, and consumer behavior. In addition, voluntary efforts by industry often go beyond the minimum standards set by regulations. "Basic" or "primary" industries, such as chemicals, are among those most heavily regulated. This is because transforming raw materials from the earth into products used by other industries -- the task of basic industries -- can generate substantial amounts of pollution. Industry, however, is not typically the largest generator of pollution in the United States.

During the past two decades, the U.S. chemical industry has conducted an extensive program to reduce the emissions of the many types of materials that contribute to air, water, and land pollution. The industry's environmental actions have necessitated capital expenditures for pollution abatement and control that have totalled nearly $17 billion since 1973. In 1991, the chemical industry's capital expenditures for pollution abatement and control were an estimated $2.4 billion, about 12 percent of chemical industry fixed capital investment and about 35 percent of those by all manufacturing industries. With passage of the 1990 amendments to the Clean Air Act, as much as 25 to 30 percent of the industry's fixed capital investment may soon be allocated to pollution abatement and control.

The period since the early 1970s has also witnessed increasing gross annual operating costs (depreciation, labor, material and supplies, services, etc.) for pollution abatement and control. Estimated at $4.5 billion in 1991, these operating costs represent about 1.5 percent of the chemical industry's value of shipments. In 1991, the chemical industry accounted for about 24 percent of all manufacturing gross annual costs for pollution abatement and control.

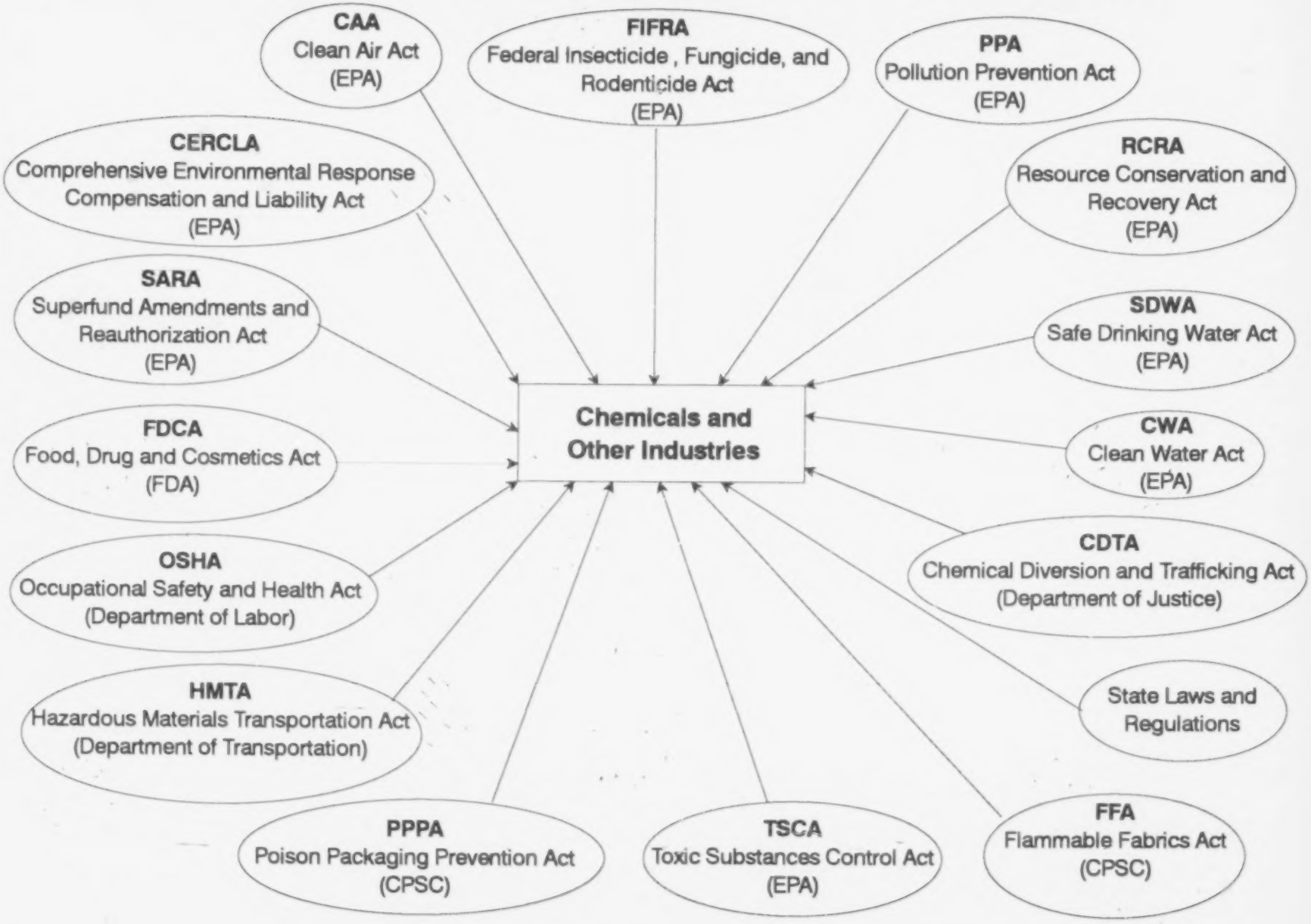
Ever tightening regulations have raised the costs of pollution control incurred by all sectors of the economy as recorded by government data to about 2 percent of GNP by 1991, with EPA forecasting increases to about 3 percent of GNP by the year 2000. Initially, much of this cost falls on U.S. industry. But in the end all of the costs of environmental improvement are passed on to individual members of the economy; whether by higher prices for products, lower wages for workers, or through lower profits that reduce capital investment, productivity gains, and U.S. industry's international competitiveness. New environmental programs being proposed at Federal, government and state levels will likely further increase the costs and difficulty of compliance. Moreover, government data do not capture all of the costs of pollution control measures to the economy. Cost-effective solutions to environmental problems are, therefore, in everyone's interests.

The U.S. chemical industry has achieved a remarkable record of safety, much better than manufacturing as a whole and other sectors of the economy. This record has continually improved during the post-World War II period, largely as a result of elimination of job hazards and the industry's initiatives in implementing effective safety programs.

This section describes some of the key health, safety and environmental laws affecting the chemical industry, provides some key measures of environmental progress, presents U.S. government data describing the costs of pollution abatement, and includes chemical industry illness and injury statistics.

Figure A

Some Major Laws Regulating Chemicals and Other U.S. Industries



Health, Safety, and Environmental Legislation

A growing number of state and federal laws set the framework for health, safety, and environmental regulation, these include:

Toxic Substances Control Act (TSCA) of 1976 gives the Environmental Protection Agency (EPA) comprehensive authority to regulate any chemical substance whose manufacture, processing, distribution in commerce, use or disposal may present an unreasonable risk of injury to health or the environment. Among other requirements, it mandates that chemical companies submit premanufacture notices that provide information on health and environmental effects for each new product and test existing products for these effects. It also gives EPA authority to prohibit, limit or ban the manufacture, process, and use of chemicals. TSCA remains in force through a continuing resolution.

Clean Air Act first passed in 1955, provides EPA authority to regulate air pollutants from automobiles, electric power plants, chemical plants and other industrial sources. Its 1990 amendments set control standards for industrial sources of 41 pollutants by 1995 and for 148 other pollutants by 2003.

Clean Water Act first passed in 1972 and amended in 1977 and 1987, provides EPA authority to regulate effluents from sewage treatment works, chemical plants, and other industrial sources into waters. The Act also asks states to identify and alleviate pollution problems. In Congress there are several proposals to reauthorize the Act.

Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) provide the basic legal framework for the Federal "Superfund" program to clean up abandoned hazardous waste sites. The 1980 CERCLA Legislation imposed specific taxes on chemicals and petroleum to fund the clean up program. The 1986 SARA legislation extended these taxes for five years and adopted a new broad-based corporate environmental tax. In 1990 these taxes were extended for an additional four years. Title III of the 1986 SARA legislation also established "right to know" standards that require petroleum refineries, chemical plants, and other industrial facilities annually to provide information to the public about stored toxic substances and annual releases of substances into the environment, known as the toxic release inventory (TRI).

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) provides EPA authority to register and assess the risks of agricultural pesticides, industrial biocides, and other non-agricultural pesticides. It was first enacted in 1947 and last amended in 1988. The statute is up for reauthorization in 1992.

Food, Drug and Cosmetics Act (FDCA) provides the Food and Drug Administration (FDA) authority to regulate the manufacturing of drugs and pharmaceuticals and the use of packaging and additives in food and cosmetics. It was first enacted in 1906 and there have been numerous revisions over the years. There are no established reauthorization dates.

Resource Conservation and Recovery Act (RCRA) of 1976 provides EPA with authority to establish standards and regulations for handling and disposing of solid and hazardous wastes. The act also requires companies to establish programs to reduce the volume and toxicity of hazardous wastes. It was last amended in 1984 with tighter standards. Reauthorization and amendment efforts for RCRA began in 1990.

Occupational Safety and Health Act provides the Department of Labor authority to set comprehensive workplace safety and health standards, including permissable exposures to chemicals in the workplace, and authority to conduct inspections and issue citations for violations of safety and health regulations.

Safe Drinking Water Act, enacted in 1974 and amended in 1977 and again in 1986, establishes standards for public drinking water supplies.

Hazardous Materials Transportation Act (HMTA) provides the Department of Transportation the authority to regulate the movement of hazardous materials.

Chemical Diversion and Trafficking Act (CDTA) of 1988 is designed to prevent the diversion of chemicals to illegal drug producers. It gives the Drug Enforcement Agency the authority to control exports of chemicals to designated drug source countries.

Pollution Prevention Act makes it the national policy of the United States to reduce or eliminate the generation of waste at the source whenever feasible and directs the EPA to undertake a multi-media program of information collection, technology transfer, and financial assistance to the States to implement this policy and to promote the use of source reduction techniques.

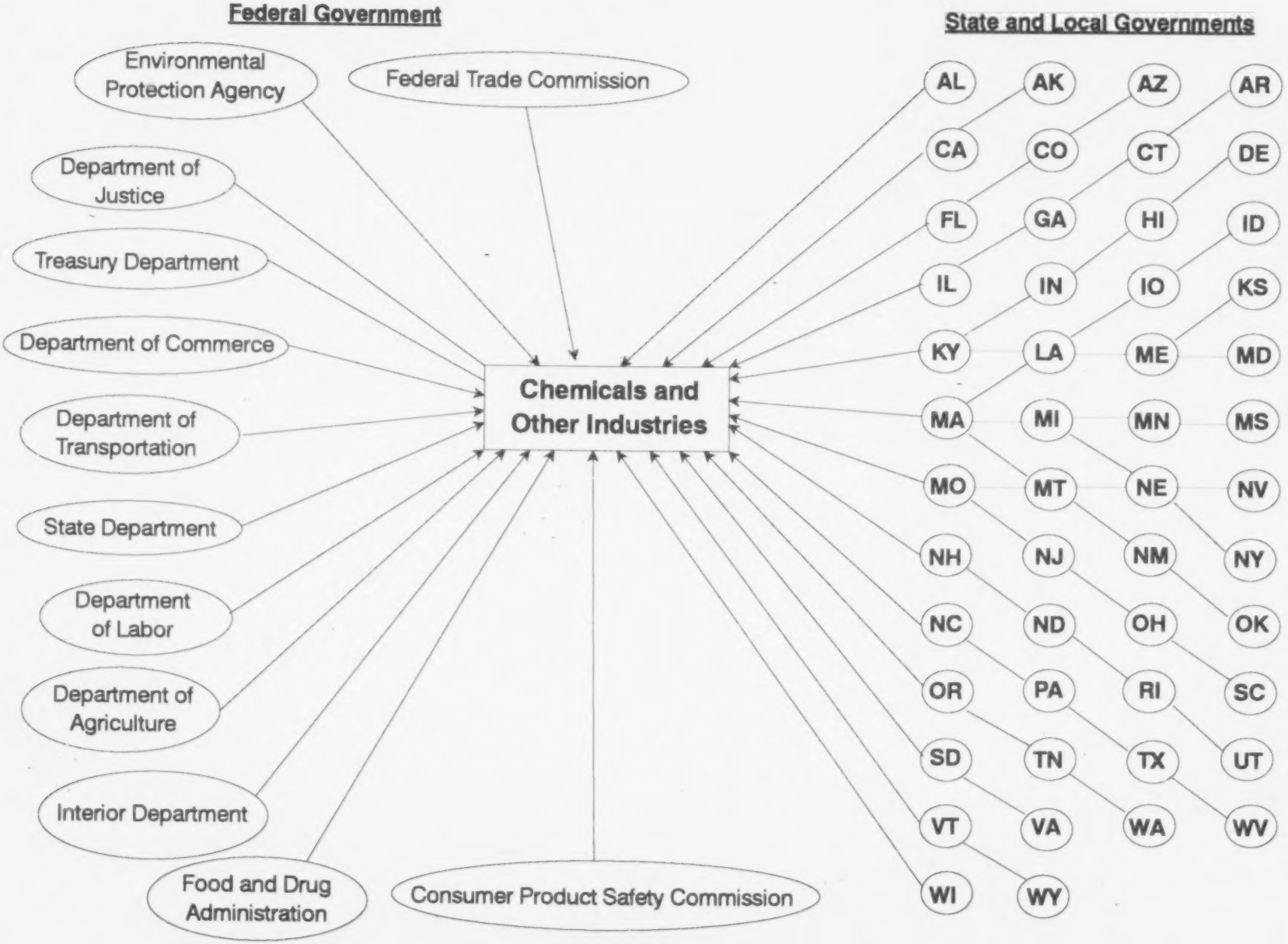
Flammable Fabrics Act, enacted in 1970 and last amended in 1983, gives the Consumer Product Safety Commission the authority to set flammability standards for fabrics that protect against an unreasonable risk of the occurrence of a fire.

Poison Packaging Prevention Act of 1953 and last amended in 1990, provides the Consumer Product Safety Commission authority to set standards for the special packaging of any household product to protect children from a hazard.

State Regulations. State governments are increasingly active in the environmental and safety areas. In addition to the state implementation role in many federal programs, the states themselves are active in a range of issues that impact the chemical industry. These include hazardous waste, toxics use reduction, chemical specific taxes and fees, and state right-to-know statutes.

Figure B

Key Administrators of Environmental, Health and Safety Regulations



Key Administrators of Environmental, Health, and Safety Regulations

Federal, state, and local laws on environmental, health, and safety matters are often detailed, complex, and lengthy. Rarely, however can these laws be written in sufficient detail to allow enforcement without even more detailed regulations that interpret -- and amplify on -- the language contained in the legislation. The regulations, or "rulings" are published in the Federal Register, the means by which very detailed regulations are communicated to business and the public. For example, a recent ruling setting standards for 23 organic and inorganic chemicals that may be found in drinking water occupied 424 pages of triple column fine print in the Federal Register.

Another example: the text of the The Clean Air Act Amendments of 1990 itself totalled some 314 pages of legal codes. The task of formulating regulations to implement this new law, however, has only begun and is expected to result in some 70 regulations over the first two years. Two example rulings may give an indication of the volume and complexity of these regulations. The recently promulgated Operating Permit Program rules occupied 62 pages of the Federal Register. And the Hazardous Organic NESHAP (National Emissions Standards for Hazardous Air Pollutants) ruling is expected to require about 300 pages of Federal Register text.

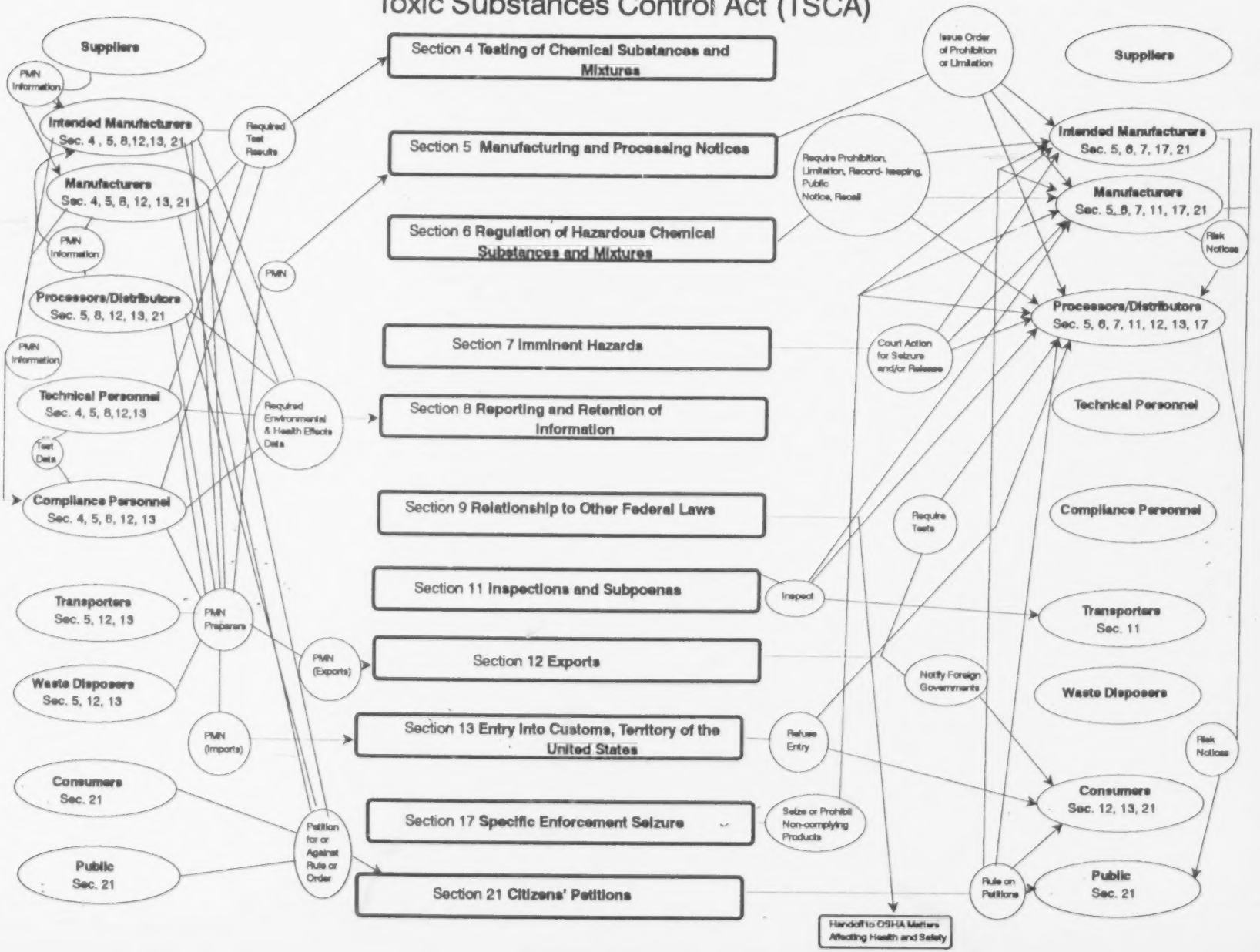
The formulation of effective, pragmatic regulations that take into account wide differences in the companies, processes and products to be regulated is a difficult and time-consuming task that must be performed by the agency assigned responsibility by the legislation. Formulating detailed, complex regulations and disseminating them is costly. So is industry compliance and reporting.

The costs and difficulty industry faces in complying with regulations are increasing not only with the number of federal laws and agencies that must be satisfied but also as a result of the increasing intervention of state and local governments into setting health, safety and environmental standards. Thus, in some cases, companies must be concerned not only about federal standards but as well about those of 50 individual states—each of which has its own complex of departments and agencies who write and enforce regulations. In some instances, county and city governments also set their own regulatory standards.

The costs to government of formulating and enforcing this maze of regulations and the costs to industry of compliance are large and growing. A recent study (The Costs of Federal Regulation, by Thomas D. Hopkins) estimates the costs of government regulations at over $4,000 per family in 1990 and projects growth to around $4,500 per family by the year 2000. The current costs of pollution control alone are estimated by the Environmental Protection Agency to be equivalent to almost 2 percent of GNP in 1991 and are projected by EPA to rise to nearly 3 percent of GNP by the year 2000.

Initially, much of the costs of federal regulation falls on individual businesses, particularly on manufacturing firms that must face international competition. In the end, however, the costs to businesses of government regulation are inevitably passed on to individual members of the economy in several ways: higher prices to consumers; lower wages to employees; lower profits that translate to less taxes paid to government, and lower dividends to stockholders. In turn, lower profits restrain new capital investment and hold down the productivity gains that are essential to improved U.S. international competitiveness and rising U.S. living standards. Thus, everyone in the economy has a stake in the amount and efficiency of government regulations.

Figure C
Toxic Substances Control Act (TSCA)


Suppliers
PMN Information
Intended Manufacturers Sec. 4 , 5, 8,12,13, 21
Manufacturers Sec. 4, 5, 8, 12, 13, 21
PMN Information
Processors/Distributors Sec. 5, 8, 12, 13, 21
PMN Information
Technical Personnel Sec. 4, 5, 8,12,13
Test Data
Compliance Personnel Sec. 4, 5, 8, 12, 13
Transporters Sec. 5, 12, 13
Waste Disposers Sec. 5, 12, 13
Consumers Sec. 21
Public Sec. 21
Required Test Results
PMN
Required Environmental & Health Effects Data
PMN Preparers
PMN (Exports)
PMN (Imports)
Petition for or Against Rule or Order
Section 4 Testing of Chemical Substances and Mixtures
Section 5 Manufacturing and Processing Notices
Section 6 Regulation of Hazardous Chemical Substances and Mixtures
Section 7 Imminent Hazards
Section 8 Reporting and Retention of Information
Section 9 Relationship to Other Federal Laws
Section 11 Inspections and Subpoenas
Section 12 Exports
Section 13 Entry into Customs, Territory of the United States
Section 17 Specific Enforcement Seizure
Section 21 Citizens' Petitions
Issue Order of Prohibition or Limitation
Require Prohibition, Limitation, Record- keeping, Public Notice, Recall
Court Action for Seizure and/or Release
Require Tests
Inspect
Notify Foreign Governments
Refuse Entry
Seize or Prohibit Non-complying Products
Rule on Petitions
Handoff to OSHA Matters Affecting Health and Safety
Suppliers
Intended Manufacturers Sec. 5, 6, 7, 17, 21
Manufacturers Sec. 5, 6, 7, 11, 17, 21
Risk Notices
Processors/Distributors Sec. 5, 6, 7, 11, 12, 13, 17
Technical Personnel
Compliance Personnel
Transporters Sec. 11
Waste Disposers
Risk Notices
Consumers Sec. 12, 13, 21
Public Sec. 21

Implementation of the Toxic Substances Control Act (TSCA)

The diagram on the facing page shows key sections of one of the important regulatory laws -- the Toxic Substances Control Act (TSCA) -- and illustrates the maze of requirements and interrelationships this one Act creates among regulators, manufacturers, and other businesses.

The Toxic Substances Control Act (TSCA), passed in 1976, provides EPA with the authority to regulate toxic substances. Unlike other environmental statutes, TSCA is product-focussed, and therefore multi-media. It provides EPA with the authority to:

- ❑ regulate new and existing chemical substances
- ❑ gather chemical exposure and toxicological information
- ❑ require testing, and
- ❑ regulate unreasonable risk.

TSCA also provides EPA with authority to regulate new uses and impose restrictions on use including—in the most severe case—banning of the substance. TSCA looks at chemicals as either existing (listed on the TSCA inventory) or new (introduced since the last inventory update).

The diagram shows 11 key sections of the law. A few examples of the many time-consuming and regulatory procedures imposed by some of the sections of TSCA noted below for illustrative purposes are:

❑ Test rules (Section 4) may require manufacturers of existing chemicals to perform extremely expensive toxicological tests. Costs range from $3,000 to $1.2 million per test, depending on the complexity of the test. Also, test rules may require a number of tests to be conducted on an individual chemical and the total cost per chemical can be as high as $5 million. Toxicity testing requirements are often more extensive than is warranted for a chemical's exposure potential which is based on its physical/chemical characteristics, production process, or use patterns that determine the exposure potential of a chemical.

❑ Submission of premanufacturing notice (PMN, Section 5 of the law) forms are required for approval of all new chemicals. Following a PMN review, EPA may take the following actions: deny approval (bar entry into the market); approve; or approve, but require additional data, or restrict uses and markets. PMNs approved with restrictions often take over a year to be processed. In worst cases, it can take up to four years to have a PMN approved.

❑ Reporting and Retention of Information (Section 8(e)) requires companies to inform EPA immediately of any information which reasonably supports the conclusion that a particular chemical substance presents a substantial risk of injury to health or the environment. EPA's guidance for Section 8(e) reporting has, however, been very unclear and has evolved over time. As a result of the confusion over reporting requirements and to encourage disclosure of previously unsubmitted information, EPA established the Compliance Audit Program (CAP). Under the CAP, on a one-time basis, studies that fall under the reporting requirements of Section 8(e) but were not previously submitted to EPA, can be submitted late with assessment of a maximum penalty of $1 million per company. However, the actual cost of the program for most participants is several millions of dollars due to the costs of conducting the extensive CAP file audit. More than 120 companies have registered for the CAP.

❑ Exports (Section 12). Companies must file export notices with EPA for materials regulated under TSCA every year for every country the chemical is shipped to. This requirement applies even to chemicals present only as trace amounts of by-products or R&D samples.

❑ Penalties imposed under TSCA regulations do not allow for administrative errors. In spite of the extensive recording-keeping required by TSCA, a simple clerical error may be subject to the same severe $25,000 per day penalty as a more serious violation.

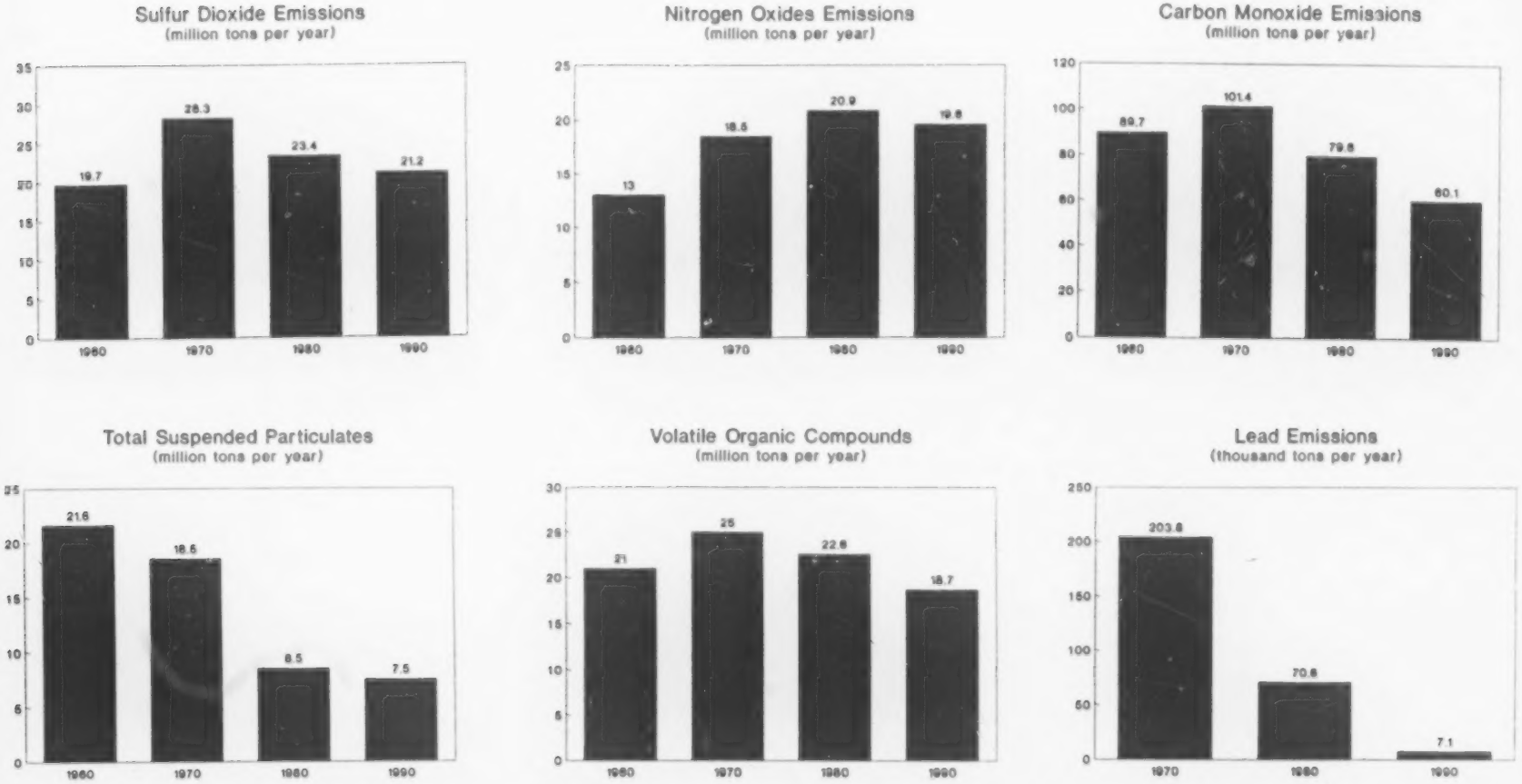
TABLE 7.1
SUMMARY OF PROGRESS IN KEY POLLUTION INDICATORS (MILLION METRIC TONS) *

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Sulfur Oxides													
Total Emissions	28.4	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.5	20.6	20.8	21.2	n/a
Industrial Processes	6.4	3.8	3.9	3.3	3.3	3.3	3.2	3.2	3.0	3.1	3.0	3.1	n/a
% of Total	22.5%	16.2%	17.3%	15.4%	15.9%	15.3%	15.2%	15.3%	14.6%	15.0%	14.4%	14.6%	
Chemicals & Allied Products	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	n/a
% of Total	1.9%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	1.6%	1.6%	1.5%	1.5%	
Nitrogen Oxides													
Total Emissions	18.5	20.9	20.9	20.0	19.3	19.8	20.0	19.1	19.4	20.0	19.8	19.6	n/a
Industrial Processes	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n/a
% of Total	3.8%	3.3%	3.1%	2.7%	2.8%	2.9%	2.8%	2.9%	2.9%	3.0%	3.0%	3.1%	
Chemicals & Allied Products	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	n/a
% of Total	1.3%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.8%	0.8%	0.8%	0.8%	
Volatile Organic Compounds													
Total Emissions	25.0	22.6	21.3	19.6	20.4	21.2	20.1	19.0	19.3	19.4	18.5	18.7	n/a
Industrial Processes	8.9	9.2	8.3	7.5	7.9	8.9	8.5	8.0	8.3	8.1	8.1	8.1	n/a
% of Total	35.7%	40.8%	39.1%	38.1%	38.6%	42.0%	42.4%	42.1%	43.0%	41.8%	43.8%	43.3%	
Chemicals & Allied Products	1.6	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	1.9	1.9	1.9	n/a
% of Total	6.2%	8.1%	8.2%	7.7%	8.5%	9.0%	9.0%	9.3%	9.1%	10.0%	10.4%	10.1%	
Particulates													
Total Emissions	18.5	8.5	8.0	7.1	7.1	7.4	7.2	6.7	6.9	7.5	7.2	7.5	n/a
Industrial Processes	10.5	3.3	3.0	2.6	2.4	2.8	2.8	2.6	2.5	2.7	2.7	2.8	n/a
% of Total	57.0%	38.8%	37.6%	36.0%	33.1%	37.6%	38.3%	38.8%	36.2%	36.0%	37.5%	37.3%	
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
% of Total	1.2%	1.6%	1.5%	1.4%	1.5%	1.8%	1.8%	1.8%	1.3%	1.3%	1.4%	1.3%	
Carbon Monoxide													
Total Emissions	101.4	79.6	77.4	72.4	74.5	71.9	68.7	63.2	63.4	64.7	60.4	60.1	n/a
Industrial Processes	9.0	6.3	5.9	4.3	4.3	4.7	4.4	4.2	4.3	4.6	4.6	4.7	n/a
% of Total	8.8%	8.0%	7.6%	6.0%	5.8%	6.5%	6.4%	6.6%	6.8%	7.1%	7.6%	7.8%	
Chemicals & Allied Products	3.1	2.0	2.0	1.5	1.7	1.9	1.8	1.7	1.7	1.8	1.8	1.7	n/a
% of Total	3.0%	2.5%	2.6%	2.1%	2.3%	2.6%	2.6%	2.7%	2.7%	2.8%	3.0%	2.9%	
Lead *													
Total Emissions	203.3	70.6	56.0	54.5	46.6	40.2	20.1	8.4	8.0	7.6	7.2	7.1	n/a
Industrial Processes	23.9	3.6	3.0	2.7	2.4	2.3	2.3	1.9	1.9	2.0	2.3	2.2	n/a
% of Total	11.7%	5.1%	5.4%	5.0%	5.2%	5.7%	11.4%	22.6%	23.8%	26.3%	31.9%	31.0%	

Source: Environmental Protection Agency
* All data are in millions of metric tons, except lead emissions, which are in thousands of metric tons.

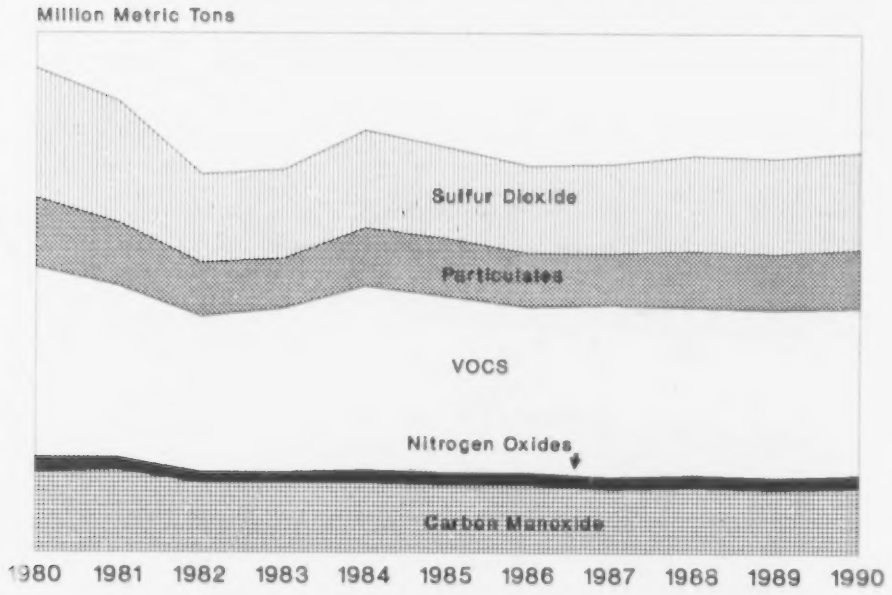
In recent years, significant progress has been made in improving the environment in the United States. Air pollution trends, as measured by emissions of 6 key air pollutants from all sources, industrial and non-industrial, illustrate this progress.

Chart 7.1
Trends in Air Emissions



Contrary to popular opinion, pollution levels in most industrial sectors have been declining, even while U.S. industrial output has grown 27 percent since 1980.

Chart 7.2
Trends in Industrial Emissions



Also contrary to popular opinion, industry is not the major source of most emissions. For example, industrial processes contributed only 15 percent of 1990 sulfur dioxide emissions; chemicals 1 percent of the total.

Chart 7.3
U.S. Emissions of Sulfur Oxides
By Source

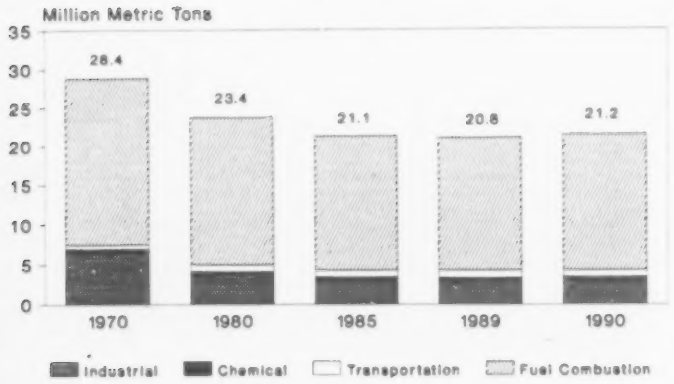


Chart 7.4
Sulfur Oxides By Source, 1990

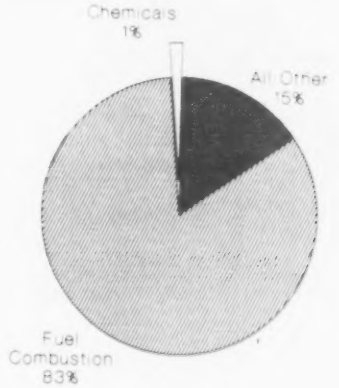


TABLE 7.2
U.S. EMISSIONS OF SULFUR OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Sulfur Oxide Emissions	28.4	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.5	20.6	20.8	21.2	n/a
Transportation	0.6	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	0.9	n/a
Fuel Combustion	21.3	18.7	17.8	17.3	16.7	17.4	17.0	16.9	16.6	16.6	16.8	17.1	n/a
Industrial Processes:	6.4	3.8	3.9	3.3	3.3	3.3	3.2	3.2	3.0	3.1	3.0	3.1	n/a
Chemicals & Allied Products	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	n/a
Other Industrial	5.9	3.5	3.7	3.1	3.1	3.1	3.0	3.0	2.7	2.8	3.1	3.1	n/a
Chemicals as a % of Total Emissions	1.9%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	1.6%	1.6%	1.5%	1.5%	

Source: Environmental Protection Agency

Transportation and fuel combustion contributed 97 percent of 1990 nitrogen oxide emissions, 1 percent came from the chemical industry.

Chart 7.5
U.S. Emissions of Nitrogen Oxides
By Source

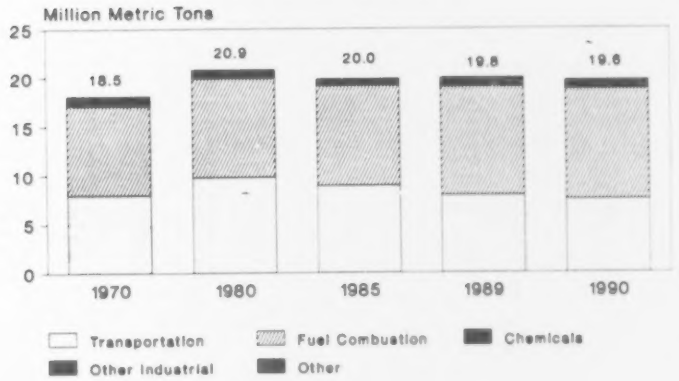


Chart 7.6
Nitrogen Oxides Emissions By Source
1990

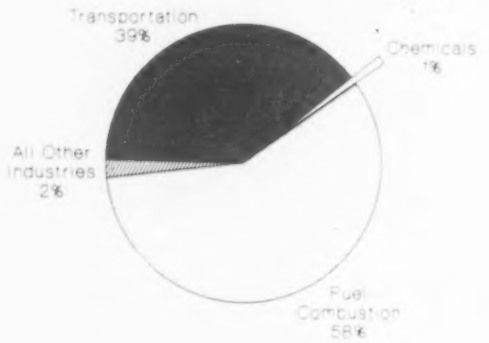


TABLE 7.3
U.S. EMISSIONS OF NITROGEN OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Nitrogen Oxide Emissions	18.5	20.9	20.9	20.0	19.3	19.8	20.0	19.1	19.4	20.0	19.8	19.6	n/a
Transportation	8.0	9.8	10.0	9.4	8.9	8.8	8.9	8.3	8.1	8.1	7.9	7.5	n/a
Fuel Combustion	9.1	10.1	10.0	9.8	9.6	10.2	10.2	10.0	10.5	10.9	11.1	11.2	n/a
Industrial Processes:	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n/a
Chemicals & Allied Products	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	n/a
Other Industrial	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	n/a
Solid Waste	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Miscellaneous	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	n/a
Chemicals as a % of Total Emissions	1.3%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.8%	0.8%	0.8%	0.8%	

Source: Environmental Protection Agency

Industry was the source of 43 percent of VOC emissions in 1990; the chemical industry is 10 percent of the total.

Chart 7.7
U.S. Emissions of Volatile Organic Compounds By Source

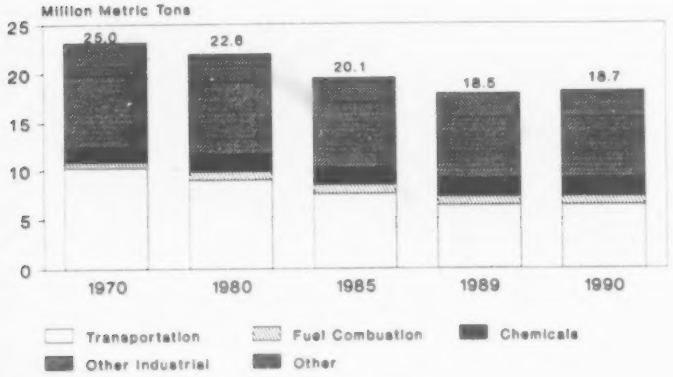


Chart 7.8
Volatile Organic Compounds By Source
1990

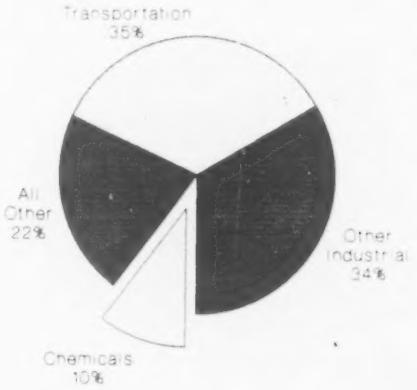


TABLE 7.4
U.S. EMISSIONS OF VOLATILE ORGANIC COMPOUNDS (VOCs) BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total VOC Emissions	25.0	22.6	21.3	19.6	20.4	21.2	20.1	19.0	19.3	19.4	18.5	18.7	n/a
Transportation	10.3	9.0	8.9	8.3	8.2	8.1	7.6	7.2	7.1	6.9	6.4	6.4	n/a
Fuel Combustion	0.6	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	n/a
Industrial Processes:	8.9	9.2	8.3	7.5	7.9	8.9	8.5	8.0	8.3	8.1	8.1	8.1	n/a
Chemicals & Allied Products	1.6	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	1.9	1.9	1.9	n/a
Other Industrial	7.4	7.4	6.6	6.0	6.1	7.0	6.7	6.2	6.5	6.2	6.2	6.2	n/a
Solid Waste	1.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n/a
Miscellaneous	3.3	2.9	2.5	2.2	2.7	2.6	2.5	2.2	2.4	2.9	2.5	2.7	n/a
Chemicals as a % of Total Emissions	6.2%	8.1%	8.2%	7.7%	8.5%	9.0%	9.0%	9.3%	9.1%	10.0%	10.4%	10.1%	

Source: Environmental Protection Agency

Transportation and fuel combustion contributed 75 percent of 1990 carbon monoxide emissions. Only 3 percent came from the chemical industry.

Chart 7.9
U.S. Carbon Monoxide Emissions By Source

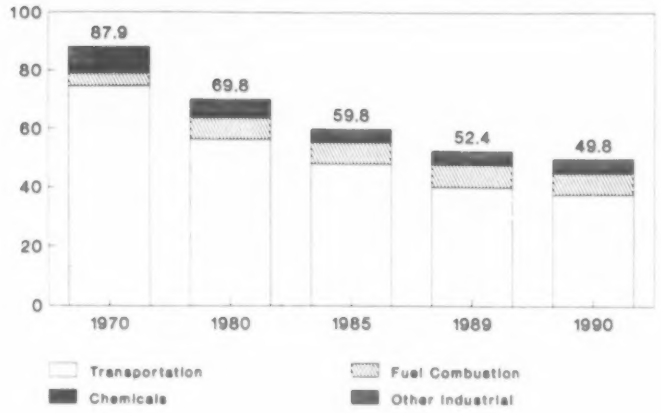


Chart 7.10
Carbon Monoxide Emissions By Source
1990

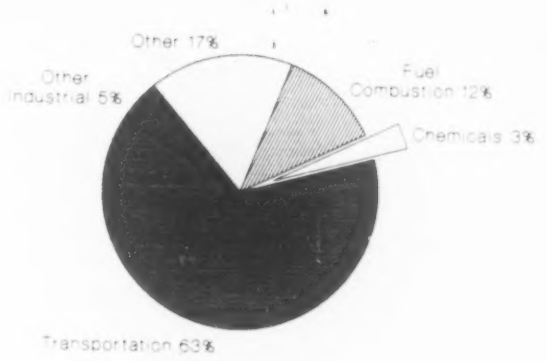


TABLE 7.5
U.S. EMISSIONS OF CARBON MONOXIDE BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Carbon Monoxide Emissions	101.4	79.6	77.4	72.4	74.5	71.9	68.7	63.2	63.4	64.7	60.4	60.1	n/a
Transportation	74.4	56.1	55.4	52.9	52.4	50.6	47.9	44.6	43.3	41.2	40.0	37.6	n/a
Fuel Combustion	4.5	7.4	7.7	8.2	8.2	8.3	7.5	7.5	7.6	7.6	7.8	7.5	n/a
Industrial Processes:	9.0	6.3	5.9	4.3	4.3	4.7	4.4	4.2	4.3	4.6	4.6	4.7	n/a
Chemicals & Allied Products	3.1	2.0	2.0	1.5	1.7	1.9	1.8	1.7	1.7	1.8	1.8	1.7	n/a
Other Industrial	5.9	4.3	3.9	2.8	2.6	2.8	2.6	2.5	2.6	2.8	2.8	3.0	n/a
Solid Waste	6.4	2.2	2.1	2.0	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	n/a
Miscellaneous	7.2	7.6	6.4	4.9	7.8	6.4	7.1	5.1	6.4	9.5	6.3	8.6	n/a
Chemicals as a % of Total Emissions	3.0%	2.5%	2.6%	2.1%	2.3%	2.6%	2.6%	2.7%	2.7%	2.8%	3.0%	2.9%	

Source: Environmental Protection Agency

Transportation and fuel combustion contributed 43 percent of 1990 particulate emissions. All of industry contributed 37 percent while only 1 percent came from the chemical industry.

Chart 7.11
U.S. Emissions of Particulates By Source

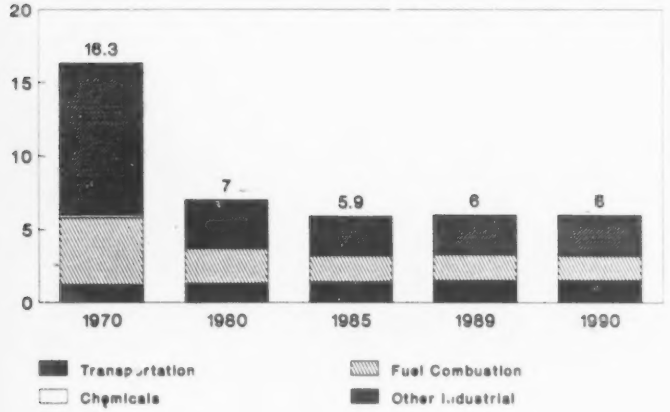


Chart 7.12
Particulates By Source, 1990

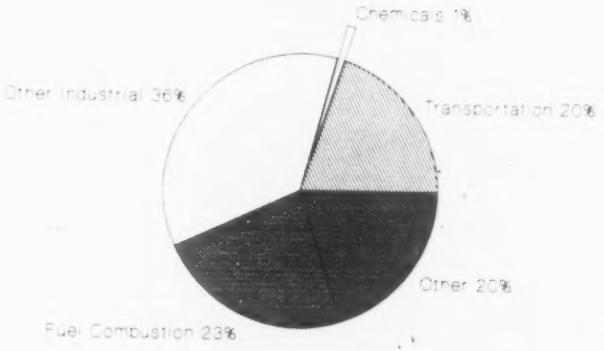


TABLE 7.6
U.S. EMISSIONS OF PARTICULATES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Particulate Emissions	18.5	8.5	8.0	7.1	7.1	7.4	7.2	6.7	6.9	7.5	7.2	7.5	n/a
Transportation	1.2	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	n/a
Fuel Combustion	4.6	2.4	2.3	2.2	2.0	2.1	1.8	1.8	1.8	1.7	1.8	1.7	n/a
Industrial Processes:	10.5	3.3	3.0	2.6	2.4	2.8	2.8	2.6	2.5	2.7	2.7	2.8	n/a
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Other Industrial	10.3	3.2	2.9	2.5	2.2	2.7	2.6	2.5	2.4	2.6	2.6	2.7	n/a
Solid Waste	1.1	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	n/a
Miscellaneous	1.1	1.1	0.9	0.7	1.1	0.9	1.0	0.8	0.9	1.3	0.9	1.2	n/a
Chemicals as a % of Total Emissions	1.2%	1.6%	1.5%	1.4%	1.5%	1.8%	1.8%	1.8%	1.3%	1.3%	1.4%	1.3%	

Source: Environmental Protection Agency

Thirty-one percent of 1990 lead emissions in 1990 came from industrial sources, the same amounts as from transportation and solid waste.

Chart 7.13
U.S. Emissions of Lead By Source

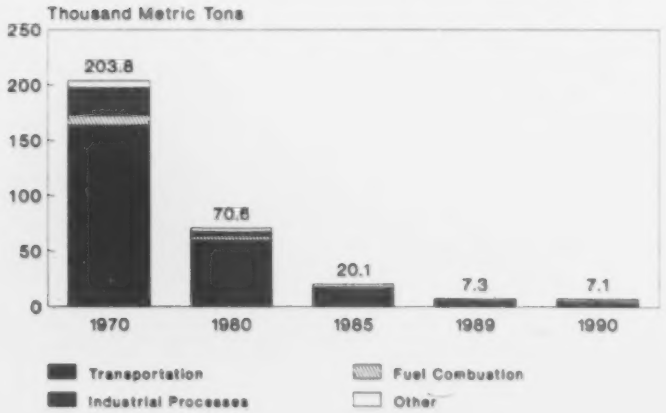


Chart 7.14
Lead Emissions By Source, 1990

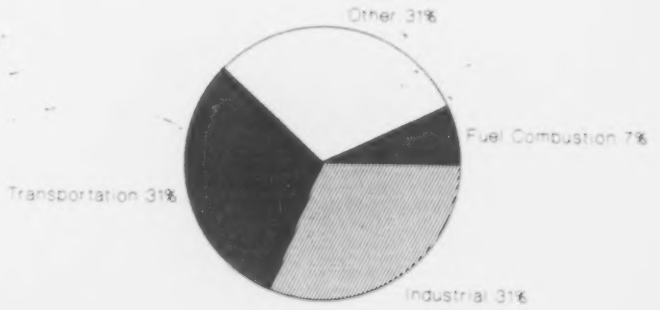


TABLE 7.7
U.S. EMISSIONS OF LEAD BY SOURCE (THOUSAND METRIC TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Lead Emissions	203.8	70.6	56.0	54.5	46.6	40.2	20.1	8.4	8.0	7.6	7.2	7.1	n/a
Transportation	163.6	59.4	46.5	47.0	40.8	34.7	14.7	3.5	3.0	2.6	2.2	2.2	n/a
Fuel Combustion	9.6	3.9	2.8	1.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	n/a
Industrial Processes	23.9	3.6	3.0	2.7	2.4	2.3	2.3	1.9	1.9	2.0	2.3	2.2	n/a
Solid Waste	6.7	3.7	3.7	3.1	2.7	2.7	2.6	2.6	2.6	2.5	2.3	2.2	n/a

Source: Environmental Protection Agency

Some other indicators of environmental improvement.

TABLE 7.8
CONTAMINANTS LEVELS IN HERRING GULL EGGS - LAKE ERIE (PARTS PER MILLION)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
DDE	n/a	3.00	3.90	5.04	2.36	3.23	2.83	2.77	1.70	2.05	2.65	2.05
Dieldrin	n/a	0.21	0.22	0.30	0.20	0.33	0.19	0.23	0.14	0.18	0.17	0.10
Mirex	n/a	0.20	0.25	0.34	0.17	0.22	0.14	0.14	0.11	0.11	0.18	0.11
HCB	n/a	0.09	0.09	0.08	0.05	0.06	0.06	0.06	0.04	0.05	0.05	0.03
PCB	n/a	45.94	56.49	59.26	37.34	46.20	38.41	33.35	22.00	27.50	54.50	30.00

Source: Environment Canada

TABLE 7.9
FARM FERTILIZER USE (MILLION TONS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Cropland Harvested (Million Acres)	293	352	366	362	306	348	342	325	302	298	318	322	319	-1.4%	-0.4%	-0.9%
lbs. Nutrient/Acre	110	131	130	118	118	125	127	121	126	132	123	128	126	-0.3%	0.8%	-1.5%
Primary Nutrient Consumption *	16.1	23.1	23.7	21.4	18.1	21.8	21.7	19.7	19.1	19.6	19.6	20.6	20.1	-1.6%	0.4%	-2.4%

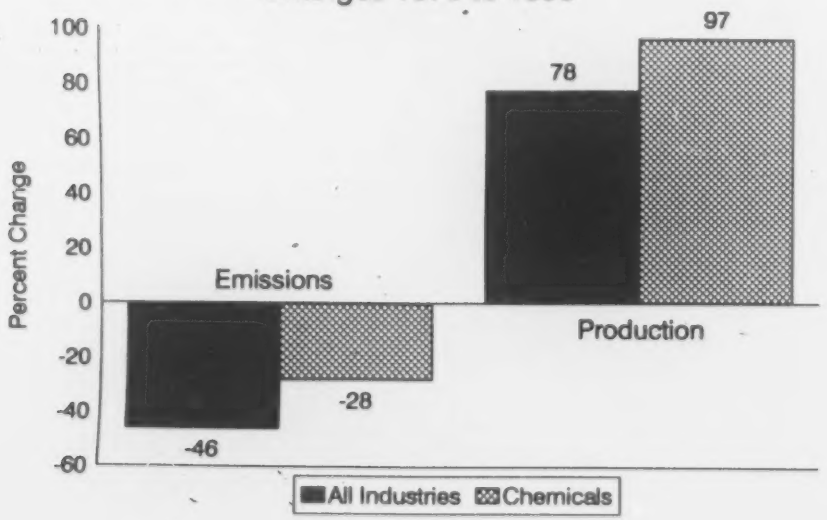
* Includes Nitrogen, Phosphorus, and Potash
Source: U.S. Department of Agriculture
1990 and 1991 cropland data are CMA estimates based on USDA data.

To summarize, pollution as measured by emissions of 6 key pollutants has been declining even while the nation's total output has been increasing.

Chart 7.15

Industrial Production and Emissions

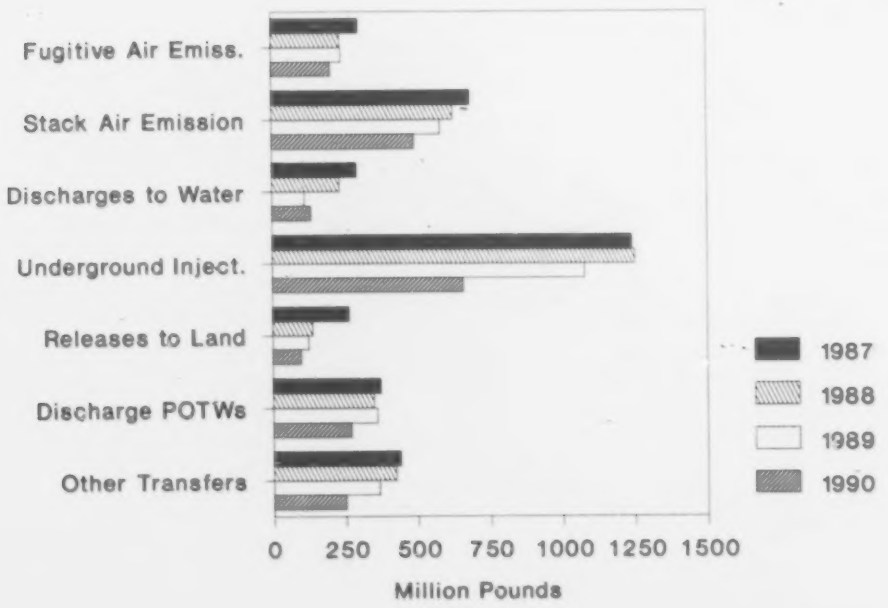
Changes 1970 to 1990



Chemical Industry "toxic" emissions -- as defined by EPA's Toxic Release Inventory Reporting Program which includes over 300 different substances -- declined 41 percent between 1987 and 1990, while production increased over 10 percent.

Chart 7.16

Toxic Emissions by the Chemical Industry



Improvements in the environment have not been without costs. Pollution abatement costs of U.S. industry - both capital expenditures and operating costs for pollution control - are rising rapidly both in current dollars and relative to GNP.

Chart 7.17
Chemical Industry Pollution Abatement

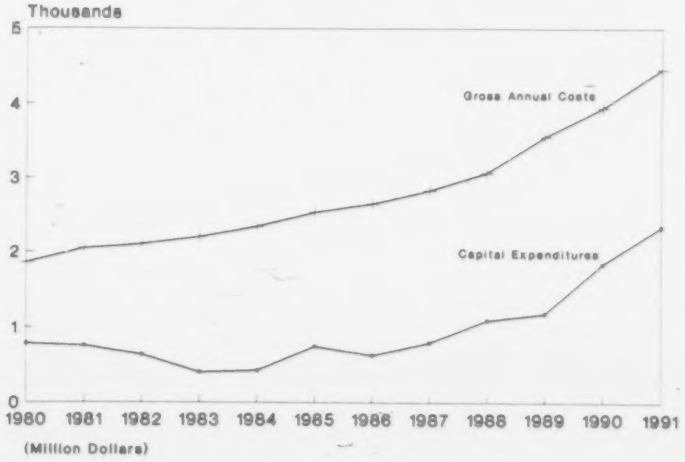
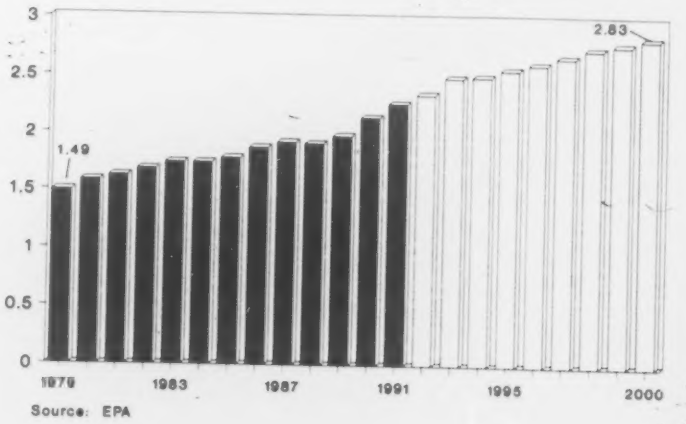


Chart 7.18
Total Annualized Costs as a Percentage of GNP



U.S. Pollution abatement control spending reached $112 billion in 1991, about 2.0 percent of GNP. According to EPA estimates, based on programs existing before enactment of amendments to the Clean Air Act, U.S. spending will rise to about 2.83 percent of GNP by the year 2000. New programs may raise this percentage still higher.

EPA data show the United States was spending somewhat more for pollution control than competitor countries in 1985, the most recent year for which comparative data are available. Recent actions, including the Clean Air Act amendments may have widened the gap.

Chart 7.19
1985 International Pollution Control Expenditures
(Percent of GNP)

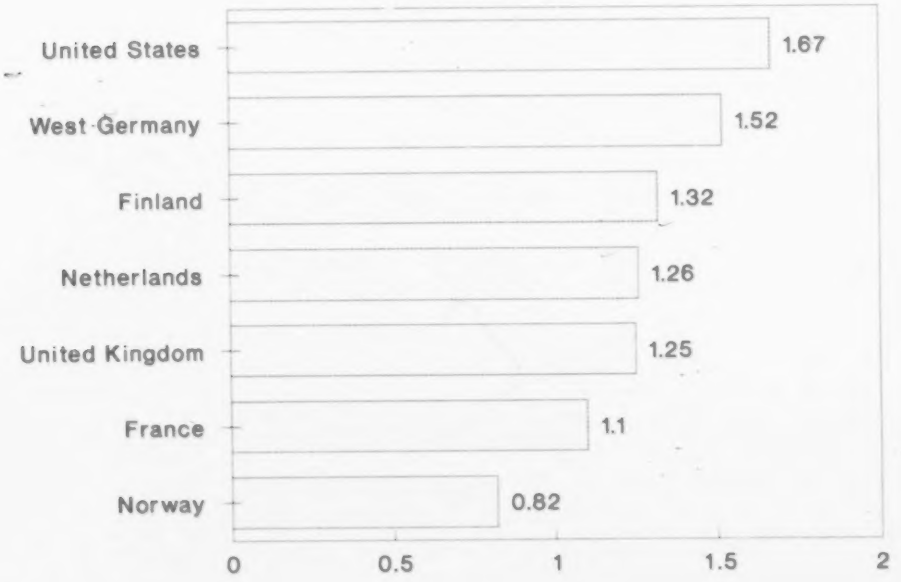


TABLE 7.10
POLLUTION ABATEMENT GROSS ANNUAL COSTS (MILLION DOLLARS)*

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	n/a	8142	9110	8565	9925	10888	11678	12258	13488	14009	15839	17070	18825	7.5%	9.0%	10.3%
Air	n/a	3298	3698	3456	3807	4189	4330	4262	4269	4467	4772	5011	5550	4.1%	5.4%	10.8%
Water	n/a	3193	3554	3489	3943	4296	4610	4820	4907	4223	5929	6416	6975	7.0%	7.7%	8.7%
Solid Waste	n/a	1651	1856	1620	2175	2403	2738	3177	4312	5319	5138	5643	6300	13.0%	14.7%	11.6%
Chemicals & Allied Products	n/a	1852	2048	2107	2198	2345	2540	2654	2836	3075	3556	3944	4450	8.1%	10.9%	12.8%
Air	n/a	540	572	556	625	622	673	647	678	706	802	842	950	5.2%	8.0%	12.8%
Water	n/a	943	1069	1112	1106	1206	1268	1302	1292	1274	1637	1799	2000	6.5%	9.0%	11.2%
Solid Waste	n/a	369	407	438	467	517	599	706	866	1094	1117	1303	1500	13.9%	16.3%	15.1%

* Data series begin in 1973
Source: Bureau of the Census
1991 data are CMA estimates based on BEA, Census, and EPA data

Chart 7.20
Composition of 1991 Pollution Abatement Costs

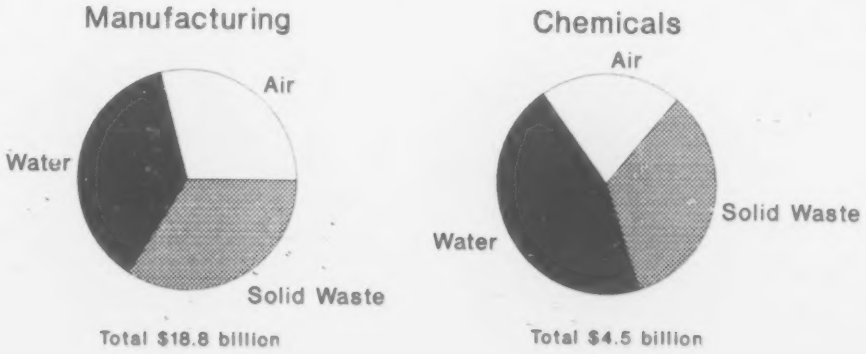


TABLE 7.11
U.S. SPENDING FOR POLLUTION ABATEMENT AND CONTROL (BILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Gross Domestic Product	1010.3	2708.0	3030.6	3149.6	3405.0	3777.2	4038.7	4268.6	4539.9	4900.4	5244.0	5513.8	5672.6	6.5%	5.9%	2.9%
% Pollution Abatement & Control		1.98%	1.90%	1.83%	1.81%	1.82%	1.85%	1.84%	1.79%	1.76%	1.74%	1.86%	1.97%	---	---	---
Pollution Abatement & Control Spending	n/a	53.54	57.47	57.68	61.78	68.93	74.64	78.72	81.49	86.06	91.35	102.80	111.50	6.9%	7.2%	8.5%
Business	n/a	32.28	35.55	35.61	37.59	42.19	45.10	46.83	49.62	52.19	57.05	63.30	68.50	6.8%	7.9%	8.2%
Government & Other	n/a	21.26	21.92	22.07	24.19	26.74	29.54	31.89	31.87	33.87	34.30	39.50	43.00	7.0%	6.2%	8.9%

Source: Bureau of Economic Analysis
1990 and 1991 data are CMA estimates based on EPA data

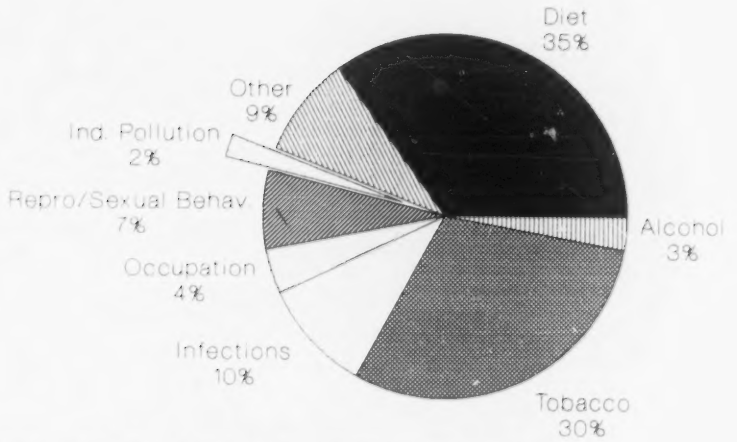
TABLE 7.12
POLLUTION ABATEMENT CAPITAL EXPENDITURES (MILLION DOLLARS)*

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	n/a	3503	3485	3024	2045	2172	2810	2847	3053	3424	4310	6031	6750	6.8%	18.8%	11.9%
Air	n/a	2105	2194	1828	1029	1038	1292	1463	1499	1524	1819	2562	2825	2.6%	14.1%	10.3%
Water	n/a	1147	1028	977	819	887	1018	1039	1101	1290	1825	2651	2875	10.8%	22.6%	8.4%
Solid Waste	n/a	251	263	219	197	247	500	345	453	610	666	818	1050	14.8%	24.9%	28.4%
Chemicals & Allied Products	n/a	781	753	628	395	418	738	624	790	1095	1195	1852	2350	12.1%	30.4%	26.9%
Air	n/a	326	335	273	159	143	194	198	259	371	380	596	750	8.4%	30.5%	25.8%
Water	n/a	350	322	257	187	212	272	325	375	488	599	995	1275	14.8%	31.4%	28.1%
Solid Waste	n/a	105	96	98	49	63	273	101	156	237	216	261	325	13.0%	26.3%	24.5%

* Data series begin in 1973
Source: Bureau of the Census
1991 data are CMA estimates based on BEA, Census, and EPA data

Concerns about cancer are a major factor in concern about reducing pollution. But air and water pollution from industrial sources typically are the cause of only a relatively small portion of total incidence of cancer, estimated at about 2 percent of the total.

Chart 7.21
Causes of Cancer in the United States



Source: The Causes of Cancer: Quantitative Estimates of Avoidable Risks Of Cancer in the United States By Richard Doll & Richard Peto (1981) Journal of The National Cancer Institute, 1981, 66(6): 1195-1308

Tobacco smoking, primarily, and diet are the dominant causes of cancer, accounting for about two-thirds of the total.

There are wide variances in the cost effectiveness of environmental and health and safety regulations.

TABLE 7.13
RISKS AND COST-EFFECTIVENESS OF SELECTED REGULATIONS AFFECTING THE U.S. CHEMICAL INDUSTRY

Regulation *1	Year Issued	Health or Safety	Agency	Baseline Mortality Risk per Million Exposed	Cost per Premature Death Averted ($ Millions 1990)
Underground Construction Standards *2	1989	S	OSHA	38,700	0.1
Trihalomethane Drinking Water Standards	1979	H	EPA	420	0.2
Hazard Communication Standard *2	1983	S	OSHA	1,800	1.6
Benzene NESHAP (Original: Fugitive Emissions)	1984	H	EPA	1,470	3.4
Ethylene Dibromide Drinking Water Standard	1991	H	EPA	NA	5.7
Benzene NESHAP (Revised: Coke By-Products) *2	1988	H	EPA	NA	6.1
Asbestos Occupational Exposure Limit *2	1972	H	OSHA	3,015	8.3
Benzene Occupational Exposure Limit *2	1987	H	OSHA	39,600	8.9
Arsenic Emission Standards for Glass Plants	1986	H	EPA	2,660	13.5
Ethylene Oxide Occupational Exposure Limit *2	1984	H	OSHA	1,980	20.5
Arsenic/Copper NESHAP	1986	H	EPA	63,000	23.0
Haz Waste Listing for Petroleum Refining Sludge	1990	H	EPA	210	27.6
Benzene NESHAP (Revised: Transfer Operations)	1990	H	EPA	NA	32.9
Acrylonitrile Occupational Exposure Limit *2	1978	H	OSHA	42,300	51.5
Abestos Occupational Exposure Limit *2	1986	H	OSHA	3,015	74.0
Arsenic Occupational Exposure Limit *2	1978	H	OSHA	14,800	106.9
Abestos Ban	1989	H	EPA	NA	110.7
Diethylstilbestrol (DES) Cattlefeed Ban	1979	H	FDA	22	124.8
Benzene NESHAP (Revised: Waste Operations)	1990	H	EPA	NA	168.2
1,2 - Dichloropropane Drinking Water Standard	1991	H	EPA	NA	653.0
Haz Waste Land Disposal Ban (1st 3rd)	1988	H	EPA	2	4,190.4
Municipal Solid Waste Landfill Standards (Proposed)	1988	H	EPA	<1	19,107.0
Formaldehyde Occupational Exposure Limit *2	1987	H	OSHA	31	86,201.8
Atrazine/Alachlor Drinking Water Standard	1991	H	EPA	NA	92,069.7
Haz Waste Listing for Wood Preserving Chemicals	1990	H	EPA	<1	5,700,000.0

*1 - 70-year lifetime exposure assumed unless otherwise specified
*2 - 45-year lifetime exposure
NA=Not Available

Source: John F. Morrall, III, "A Review of The Record", Regulation, Vol 10, No. 2 (1986), p. 30. Updated by Morrall, et al

- A form of cost-benefit analysis, cost-effectiveness analysis attempts to determine the least cost of achieving a regulatory objective, in most cases the value of saving a statistical life. Baseline risks generally reflect the mortality risk per million of statistical lives exposed. In most cases the actual number of persons exposed is much less. Further, a 70 or 45 year lifetime exposure is often assumed. Given the mobility of the American labor force, actual exposure is often much lower. The cost per premature death averaged, or prevented, is based on the cost per estimated statistical life saved from regulatory policies. Because the actual risk is often lower, the actual costs per estimated life saved is generally much higher than original estimates.

Since 1982 fatalities involving transportation of hazardous material have averaged 10 annually. Gasoline and other petroleum products averaged over 8 per year; chemicals less than two annually.

TABLE 7.14
OCCUPATIONAL INJURY & ILLNESS RATES (PER 100 FULL-TIME EMPLOYEES)*

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Private Sector:													
Total Cases	n/a	8.7	8.3	7.7	7.6	8.0	7.9	7.9	8.3	8.6	8.6	8.8	n/a
Lost Workday Cases	n/a	4.0	3.8	3.5	3.4	3.7	3.6	3.6	3.8	4.0	4.0	4.1	n/a
Lost Workdays	n/a	65.2	61.7	58.7	58.5	63.4	64.9	65.8	69.9	76.1	78.7	84.0	n/a
Manufacturing:													
Total Cases	n/a	12.2	11.5	10.2	10.0	10.6	10.4	10.6	11.9	13.1	13.1	13.2	n/a
Lost Workday Cases	n/a	5.4	5.1	4.4	4.3	4.7	4.6	4.7	5.3	5.7	5.8	5.8	n/a
Lost Workdays	n/a	86.7	82.0	75.0	73.5	77.9	80.2	80.6	95.5	107.4	113.0	120.7	n/a
Chemicals & Allied Products:													
Total Cases	n/a	6.8	6.6	5.7	5.5	5.3	5.1	6.3	7.0	7.0	7.0	6.5	n/a
Lost Workday Cases	n/a	3.1	3.0	2.5	2.5	2.4	2.3	2.7	3.1	3.3	3.2	3.1	n/a
Lost Workdays	n/a	50.3	48.1	39.4	42.3	40.8	38.8	49.4	58.8	59.0	63.4	61.6	n/a

* Data series begin in 1972 and 1973
Source: Bureau of Labor Statistics

TABLE 7.15
TRANSPORTATION INCIDENTS, INJURIES, AND FATALITIES INVOLVING HAZARDOUS MATERIALS

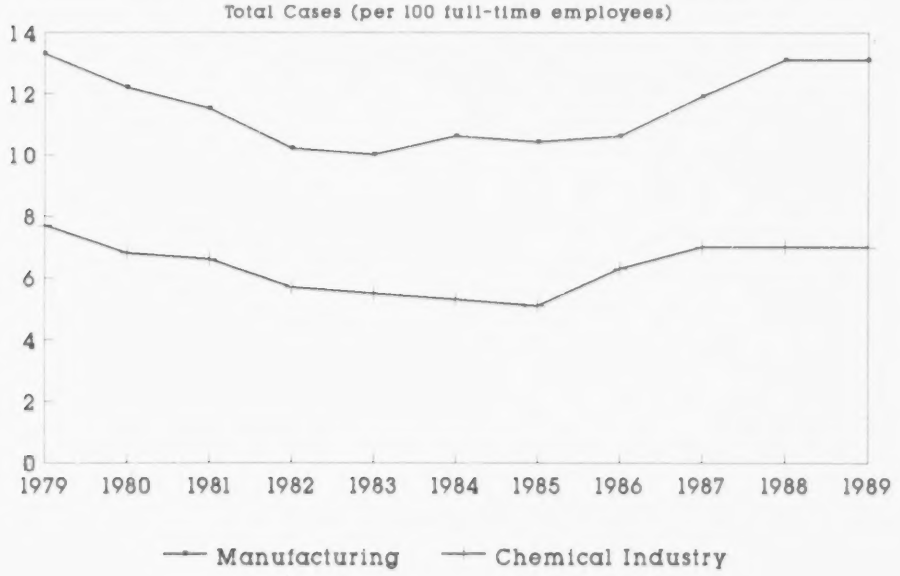
Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Incidents	n/a	15737	10042	6615	5819	5764	6019	5759	6138	6185	7545	8687	n/a
Total Injuries	n/a	626	642	125	189	259	253	316	331	171	329	390	n/a
Total Fatalities by Material	n/a	19	25	13	8	7	8	17	10	15	8	4	10
Gasoline	n/a	n/a	n/a	3	5	0	5	10	6	4	6	3	8
Other Petroleum Products	n/a	n/a	n/a	8	3	2	2	5	1	10	1	0	2
Chemicals	n/a	n/a	n/a	2	0	5	0	2	3	1	1	1	0
Other Materials	n/a	n/a	n/a	0	0	0	1	0	0	0	0	0	0

Source: Department of Transportation

The chemical industry's incidence of injury and illness is one of American industry's lowest.

Chart 7.22

Incidence of Injury and Illness



Changes in reporting requirements in 1985 coupled with improved reporting may be significant factors in trends observed in the period 1985 to 1989.

Section 8
Energy

The U.S. chemical industry is energy intensive and relies on energy inputs not only as fuel and power for its operations, but also as raw materials, or feedstocks, in the manufacture of many of its products. For example, oil and gas are raw materials for the manufacture of organic chemicals. The term energy as used in this publication includes consumption for both feedstocks and fuel and power for production processes. Chemical industry energy consumption for these purposes amounted to 5.4 quads (quadrillion BTUs) in 1991, about 7 percent of total U.S. energy consumption. The industry's total energy needs are equivalent to about 2.6 million barrels of crude oil per day, but are drawn from a wide mix of energy sources:

Crude Oil and Derivatives	45%
Natural Gas	30%
Electricity	17%
Coal	6%
Others	2%
Total	100%

Fuel and power accounted for 52 percent (2.8 quads) of total chemical industry energy consumption, with feedstocks accounting for the remaining 2.6 quads (48 percent). The chemical industry is the single largest user of natural gas, accounting for 10 percent of all U.S. natural gas consumption. The chemical industry is also a large user of petroleum products, accounting for about 7 percent (1.2 million barrels of oil per day) of all U.S. petroleum products consumption.

Energy represents a significant share of U.S. chemical industry manufacturing costs. For some products, energy for both fuel and power needs and feedstocks account for up to 85 percent of total production costs. In 1991, the industry spent an estimated $24 billion on purchases of fuel and power and feedstocks.

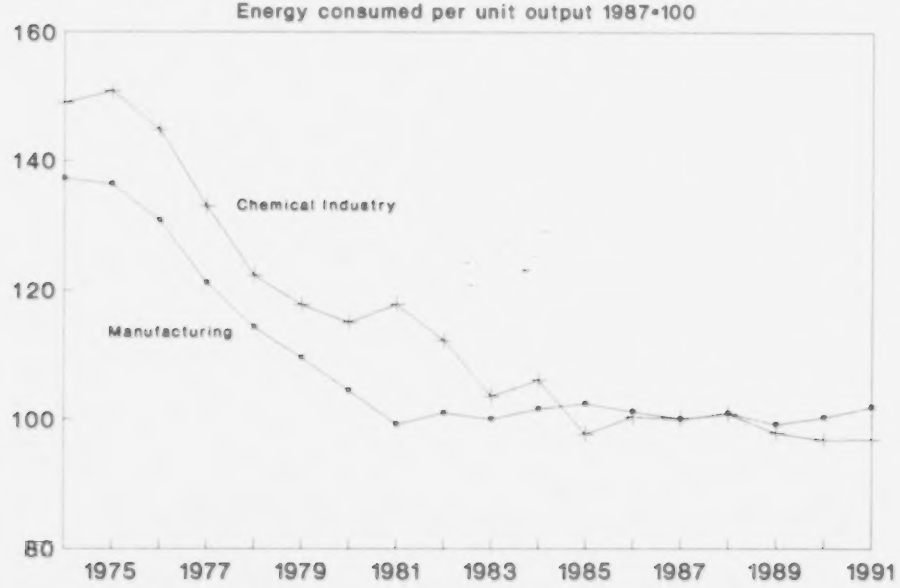
Overall, however, this energy cost represents only 8 percent of the value of industry shipments. Moreover, value-added by the chemical industry is equivalent to five times this energy cost, which is just one of many inputs, including raw materials and services, that the chemical industry purchases from other industries. On a prorata basis (7 percent of total U.S. petroleum products consumption), the chemical industry might be thought of as consuming 1 percent, or about $3.8 billion of 1991 U.S. petroleum imports that totalled $50.8 billion. In 1991, however, chemical industry exports was over $43 billion and yielded a chemicals trade surplus of $18.8 billion.

The U.S. chemical industry has achieved significant energy efficiency gains. Energy consumption per unit of output declined by over 40 percent between 1970 and 1991, a trend that should continue in the 1990s. Indeed further improvements in energy efficiency are essential for the U.S. chemical industry to maintain its competitive edge in domestic and world markets.

During the past decade, the U.S. chemical industry has made significant progress in improving energy efficiency.

Chart 8.1

Fuel & Power Energy Efficiency Trends



Source: Federal Reserve Board, Department of Energy, CMA

TABLE 8.1
CHEMICAL INDUSTRY TOTAL ENERGY CONSUMPTION

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Chemical Industry GNP (Billion 1982 Dollars	34.4	50.0	54.0	55.3	59.7	59.4	59.1	64.6	71.9	77.5	76.1	77.4	77.7	3.7%	3.8%	0.4%
BTUs/Thousand Dollars)	1201	1053	957	773	713	798	773	744	681	668	669	683	699	-3.1%	-1.2%	2.4%
Energy Consumption (Trillion BTUs)	4132	5264	5169	4274	4257	4741	4567	4808	4895	5179	5089	5287	5433	0.5%	2.5%	2.8%
Fuel and Power	2528	2721	2830	2474	2442	2613	2407	2559	2694	2862	2816	2814	2830	0.0%	2.0%	0.6%
Feedstocks	1604	2543	2339	1800	1815	2128	2160	2249	2201	2317	2273	2473	2603	1.1%	3.0%	5.3%
As a % of the Total:																
Fuel and Power	61.2%	51.7%	54.7%	57.9%	57.4%	55.1%	52.7%	53.2%	55.0%	55.3%	55.3%	53.2%	52.1%			
Feedstocks	38.8%	48.3%	45.3%	42.1%	42.6%	44.9%	47.3%	46.8%	45.0%	44.7%	44.7%	46.8%	47.9%			

Source: Bureau of Economic Analysis, CMA estimates (see below)

TABLE 8.2
FUEL AND POWER CONSUMPTION (TRILLION BTUS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	12710	11946	11563	11224	11737	13170	13615	13846	14512	15489	15674	15992	15875	3.2%	2.8%	-0.7%
Chemicals & Allied Products	2528	2721	2830	2474	2442	2613	2407	2559	2694	2862	2816	2814	2830	0.0%	2.0%	0.6%
Chemicals as a % of Manufacturing	19.9%	22.8%	24.5%	22.0%	20.8%	19.8%	17.7%	18.5%	18.6%	18.5%	18.0%	17.6%	17.8%			

Sources: Bureau of the Census, Federal Reserve Board, Department of Energy, CMA estimates

TABLE 8.3
CHEMICAL INDUSTRY FEEDSTOCK CONSUMPTION (TRILLION BTUS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Feedstock Consumption	1604	2543	2339	1800	1815	2128	2160	2249	2201	2317	2273	2473	2603	1.1%	3.0%	5.3%
Liquefied Gases:	381	508	509	461	500	809	814	744	748	813	777	794	856	5.3%	2.9%	7.8%
Ethane	260	385	388	356	376	663	646	557	547	587	523	580	632	5.0%	2.6%	9.0%
Propane & Propylene*	77	100	103	99	103	109	115	120	126	139	149	138	145	3.4%	3.9%	5.1%
Butane & Butylene	38	19	13	4	20	31	41	48	52	60	69	49	35	10.0%	-6.2%	-28.6%
Isobutane	6	4	4	2	1	5	11	19	23	27	36	28	44	28.5%	18.5%	57.1%
Heavy Liquids:	559	1422	1261	925	880	831	828	1045	995	1033	1029	1194	1239	-0.2%	3.5%	3.8%
Naphtha	301	475	441	316	284	276	236	341	348	356	389	348	318	-3.2%	-1.4%	-8.6%
Other Oils	182	862	729	522	512	470	505	610	555	583	546	754	832	1.3%	6.4%	10.3%
Still Gas	76	85	91	87	85	85	87	93	92	94	93	92	89	-0.2%	-1.0%	-3.3%
Natural Gas	624	586	544	393	414	468	500	442	441	455	452	468	478	-1.3%	1.6%	2.1%
Coal	41	27	26	21	20	20	19	18	17	16	15	17	17	-4.0%	-1.5%	0.0%

* Some propane and propylene consumption is included in the natural gas data.
Sources: American Gas Association, Bureau of the Census, Bureau of Mines, Department of Energy, CMA estimates

TABLE 8.4
ELECTRIC POWER USE (1987=100)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Manufacturing	n/a	96.9	97.3	87.1	90.8	97.8	95.5	96.1	100.0	104.7	108.0	109.1	107.6	1.0%	2.3%	-1.4%
Chemicals & Allied Products	n/a	100.9	100.3	92.4	97.5	102.0	99.0	98.0	100.0	99.9	109.9	113.8	112.7	1.2%	2.8%	-1.0%
Industrial Inorganic Chemicals	n/a	109.0	106.9	98.8	101.6	106.5	100.9	98.4	100.0	95.8	112.6	118.7	115.7	0.8%	3.3%	-2.5%
Plastics Materials and Synthetics	n/a	79.8	80.6	73.0	86.7	91.2	90.9	95.5	100.0	106.1	106.3	104.9	106.6	2.8%	2.2%	1.6%
Drugs	n/a	73.7	76.9	79.1	83.8	86.6	90.0	97.0	100.0	107.1	106.0	108.1	113.0	3.9%	3.1%	4.5%
Soaps, Cleaners, and Toilet Goods	n/a	79.5	80.0	79.9	86.1	88.4	92.0	98.5	100.0	107.6	111.8	114.3	116.9	3.9%	3.5%	2.3%
Industrial Organic Chemicals	n/a	138.1	138.9	122.4	126.1	113.6	106.5	99.6	100.0	94.3	99.0	105.5	104.3	-2.8%	0.9%	-1.1%
Agricultural Chemicals	n/a	134.0	137.1	117.1	107.9	115.5	111.3	102.1	100.0	104.7	104.4	103.3	105.6	-2.6%	0.7%	2.2%

Source: Federal Reserve Board

TABLE 8.5
ENERGY INPUT PRICES (CURRENT DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Crude Oil, Wellhead ($/bbl)	3.18	21.59	31.77	28.52	26.19	25.88	24.09	12.51	15.40	12.58	15.86	20.03	16.50	-6.3%	5.7%	-17.6%
Natural Gas, Wellhead ($/000 cubic feet)	0.17	1.59	1.98	2.46	2.59	2.66	2.51	1.94	1.67	1.69	1.69	1.71	1.59	-2.2%	-3.9%	-7.0%
Coal, Mine Value ($/ton)	6.26	24.52	26.29	27.14	25.85	25.51	25.10	23.70	23.00	22.09	21.77	21.94	21.76	-1.9%	-1.7%	-0.8%
Industrial Electricity Rates (cents/kWh)	n/a	3.7	4.3	5.0	5.0	5.0	5.2	4.9	4.7	4.6	4.7	4.7	4.9	1.3%	0.0%	4.3%

Source: Department of Energy

TABLE 8.6
U.S. OIL IMPORT DEPENDENCE (THOUSAND BARRELS PER DAY)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Petroleum Products Consumed	14695	17056	16058	15296	15231	15726	15726	16281	16665	17283	17325	16988	16641	0.4%	0.4%	-2.0%
Crude Oil and Petroleum Products Imports	3419	6909	5996	5113	5051	5437	5067	6224	6678	7402	8061	8018	7576	2.4%	4.0%	-5.5%
% Supplied by Imports	23.3%	40.5%	37.3%	33.4%	33.2%	34.6%	32.2%	38.2%	40.1%	42.8%	46.5%	47.2%	45.5%	--	--	--

Source: Department of Energy

TABLE 8.7
U.S. EMISSIONS OF CARBON DIOXIDE (MILLION METRIC TONS OF CARBON), ALL INDUSTRIES, ALL USES

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
Total Carbon Dioxide Emissions	1165	1260	1210	1146	1150	1189	1202	1205	1254	1314	1329	1318	1302	0.7%	1.6%	-1.2%
Solid Fuels	322	395	403	390	406	428	448	440	463	491	498	495	491	2.0%	2.2%	-0.8%
Liquid Fuels	515	581	533	502	500	507	506	531	545	566	567	550	539	0.1%	0.3%	-2.0%
Gas Fuels	312	273	264	245	234	242	237	223	234	245	252	262	261	-0.1%	3.2%	-0.4%
Cement	9	9	9	8	9	10	10	10	10	10	10	9	9	0.0%	-2.1%	0.0%
Gas Flaring	7	2	1	1	1	2	1	1	2	2	2	2	2	7.2%	14.9%	0.0%

Source: Oak Ridge National Laboratory
1990 and 1991 data are CMA estimates based on DOE data.

Section 9
State Chemical Industries

The regions and states of the United States are economically interdependent. Each state's economy depends on the continuing availability of goods and services from other states and on its ability to sell its goods and services throughout the nation.

The U.S. chemical industry takes certain petroleum products, natural gas, and other naturally-occurring raw materials and converts them into a wide variety of basic chemicals. These basic chemicals (including petrochemicals such as ethylene, propylene, and butadiene) are then transferred to other sectors of the chemical industry for conversion into chemical intermediates (phthalic anhydride, vinyl chloride, etc.) and final chemical products such as plastics, man-made fibers, synthetic rubber, etc. In turn, these chemical industry products are fabricated by many different industries into thousands of essential industrial and consumer products.

The United States was an early leader in developing a chemical industry. The industry has gone through several growth phases, the first of which centered around 1900. The most recent period of rapid growth began during World War II. Much of this growth in the basic chemicals (and petrochemicals) segment of the industry has been concentrated along the U.S. Gulf Coast, where petroleum and natural gas raw materials (or feedstocks) are available. Much of basic chemicals production is still concentrated in the Gulf Coast area, with Texas and Louisiana producing about 70 percent of all primary petrochemicals. The conversion of these basic chemicals into plastics, man-made fibers, synthetic rubber, and other chemical products is not as heavily concentrated on the Gulf Coast. Instead, the foci of production tend to be more diffuse. For example, the majority of total man-made fiber production occurs in the Southeast, while production of other chemical products such as plastics, pharmaceuticals, and fertilizers is even more widely dispersed among the states.

In rank order, the ten leading states in chemical shipments are Texas, New Jersey, Louisiana, Illinois, Ohio, North Carolina, California, Pennsylvania, New York, and Indiana. Combined, the chemical industry in these 10 states employed 636,000 people and accounted for 65 percent of total chemical industry shipments in 1989 and about the same proportion of total industry employment.

Although the chemical industry makes a vital contribution to the economy of every state, 66 percent of chemical production is concentrated in 10 states.

Chart 9.1

Chemical Shipments by State - 1989

($275 Billion)

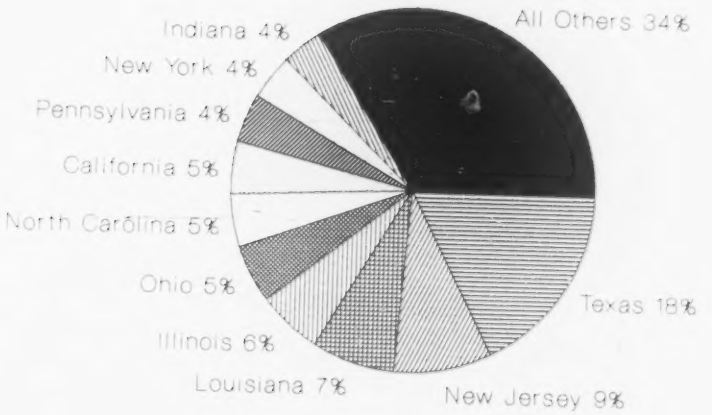
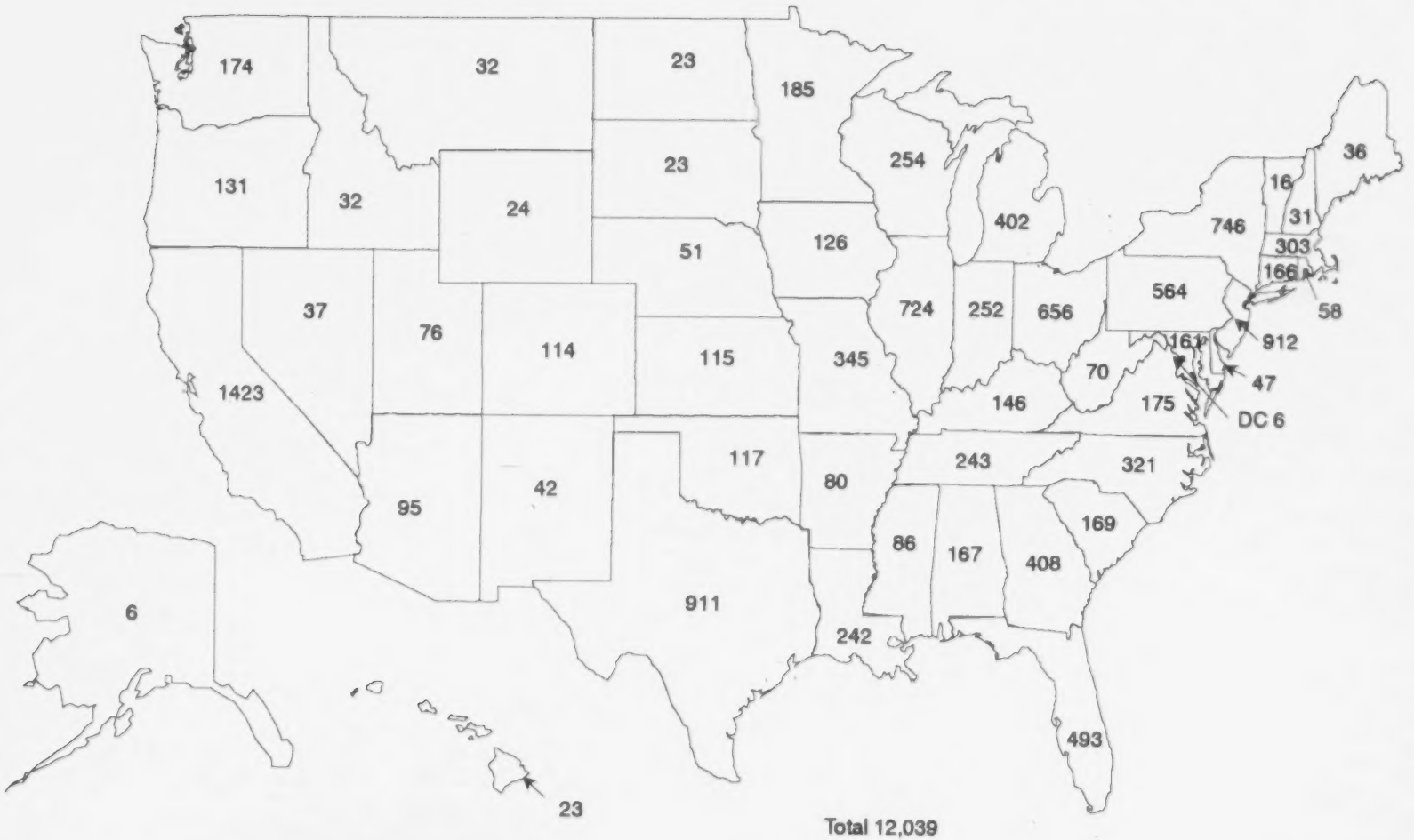


TABLE 9.1
TOP 30 CHEMICAL PRODUCING STATES

State	Value of Chemical Shipments (million $) 1989	Chemical Gross State Product (million $) 1989	Total Gross State Product (million $) 1989	Chemical % of Total Product (%) 1986	Chemical Employment (thousands) 1990	Wages and Salaries (million $) 1990	Chemical Establishments (number) 1987	Chemical Exports * (million $) 1987
1 Texas	47156	9834	340057	2.9%	83.3	4486	911	9770
2 New Jersey	23496	10856	203375	5.3%	119.3	6129	912	2641
3 Louisiana	19735	2985	79138	3.8%	29.2	1507	242	3969
4 Illinois	15635	6669	256478	2.6%	63.4	2895	724	1780
5 Ohio	14057	5889	211545	2.8%	65.8	2914	656	1956
6 North Carolina	12726	3309	130085	2.5%	45.1	1912	321	1405
7 California	12604	6359	697381	0.9%	74.6	3084	1423	1524
8 Pennsylvania	11553	5867	227898	2.6%	62.4	3047	564	1277
9 New York	10914	5953	441068	1.3%	61.2	2879	746	1431
10 Indiana	9695	3278	105314	3.1%	31.8	1576	252	1145
11 Tennessee	9211	2498	92267	2.7%	40.0	1616	243	1681
12 South Carolina	8586	3273	60150	5.4%	40.2	1613	169	1616
13 Michigan	7994	3348	181827	1.8%	44.5	2087	402	1794
14 Virginia	7249	2419	136497	1.8%	30.4	1196	175	1643
15 Missouri	6785	3183	100081	3.2%	30.2	1465	583	672
16 Georgia	6178	1977	129776	1.5%	19.9	704	408	701
17 Florida	6137	1578	226964	0.7%	23.2	859	493	1641
18 West Virginia	5043	1533	27922	5.5%	18.0	859	70	1339
19 Kentucky	4776	1178	65858	1.8%	14.5	605	146	766
20 Alabama	4017	922	67886	1.4%	12.0	504	167	706
21 Connecticut	3613	1922	88863	2.2%	22.5	1191	166	517
22 Maryland	3530	1347	99074	1.4%	14.3	550	161	353
23 Iowa	2878	1147	52574	2.2%	6.8	237	126	307
24 Massachusetts	2778	1444	144791	1.0%	17.9	797	303	355
25 Delaware	2671	2436	15418	15.8%	34.3	1953	47	351
26 Wisconsin	2610	1018	93978	1.1%	11.1	455	254	230
27 Kansas	2186	798	48829	1.6%	7.7	288	115	218
28 Mississippi	1947	581	38135	1.5%	6.6	250	86	440
29 Minnesota	1798	726	93559	0.8%	10.0	368	185	121
30 Washington	1758	933	96233	1.0%	13.4	575	174	267
United States	275187	98763	5164671	1.9%	1093.0	50259	12039	378797

* Includes both direct and supporting exports.
Source: Bureau of the Census, Bureau of Economic Analysis

Number of Chemical Establishments, 1987



Source: Bureau of the Census

Section 10
World Chemical Industries and Trade

The chemical industry is worldwide in scope. Virtually every nation has a chemical industry and is engaged in the foreign trade of chemical raw materials, industrial chemicals, or chemical products. The bulk of the world's estimated $1.25 trillion chemical output, however, is accounted for by a handful of industrialized developed nations. Combined, the United States, Japan, West Germany, France, the United Kingdom, Italy, Spain, Belgium/Luxembourg, the Netherlands, and Canada accounted for 65 percent of total world chemical output in 1991.

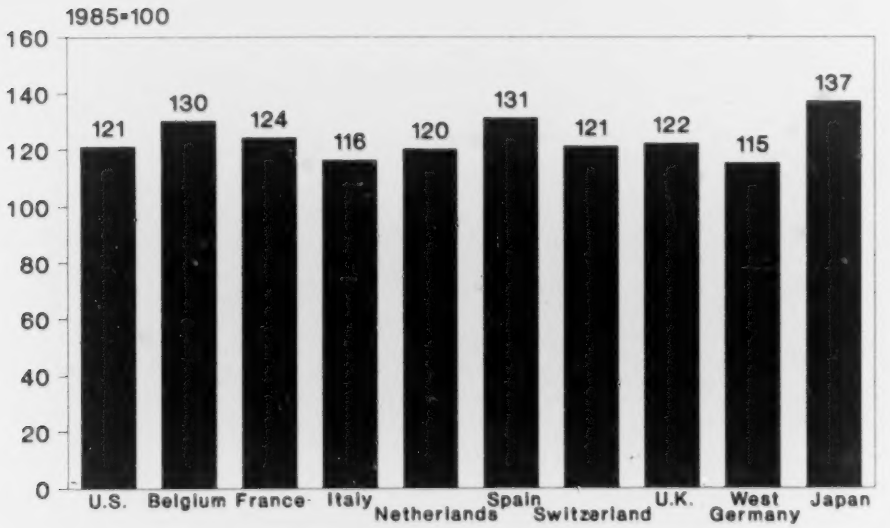
The United States alone produced $288 billion, about 23 percent of the total. Japan has the second largest chemical industry with 1991 output of $165 billion. This was followed by West Germany ($94 billion), France ($64 billion), and the United Kingdom ($51 billion). The chemical industries of these industrialized developed nations typically produce a wide variety of chemicals ranging from commodity industrial chemicals to specialty chemicals that are tailored for unique applications. Each also has a large body of technological knowledge in research and process engineering, abundant capital and management skills, and skilled and technically competent labor forces. Many of these industrialized developed nations (West Germany, United States, the Netherlands, Switzerland, France, and the United Kingdom) have historically maintained trade surpluses in chemicals. In 1991, West Germany was the largest exporter ($50 billion), followed by the United States ($43 billion), France ($29 billion) and the United Kingdom ($24 billion). Japan exports a relatively small portion of its output.

In developing nations, domestic chemical industries generally make simple chemical products such as fertilizers and inorganic commodity chemicals. Some also produce minor volumes of specialty chemicals. Up until the last decade, these developing nations represented export markets for the chemical industries of the developed nations and provided little or no competition in other markets. During the 1980s, however, many developing nations have embarked on ambitious programs to develop globally competitive chemical industries. This group includes several of the newly industrializing countries (NICs) of Asia such as Singapore, South Korea, Taiwan, and Thailand. Many of the larger economies of Latin America (Argentina, Brazil, Mexico and Venezuela) have also initiated large investments in their chemical industries.

A major development beginning in the 1960s has been the globalization of the chemical industry -- investments by companies of many countries in production facilities in foreign countries and the development of world markets with prices set by global supply and global demand for many chemicals. This was fostered by world economic growth, the reduction of tariffs and other trade barriers which promoted world trade, and advances in telecommunications and air transportation. This globalization of investments and markets has spread industry capital resources, technology, and managerial capabilities around the world and has resulted in the emergence of multinational chemical companies. Although a number of large companies had foreign subsidiaries for many years, international investment by American and Western European companies grew at a particularly rapid pace during the 1980's.

Since 1985, the U.S. output of chemicals has grown by 21 percent, below the increases in several other countries. Of 10 OECD countries, growth increased fastest in Japan, Spain, and Belgium.

Chart 10.1
World Chemical Production Growth Indices
1991



In terms of output, the U.S. chemical industry is the largest, followed by Japan, West Germany, France, and the United Kingdom. In terms of employees, the U.S. chemical industry is by far the largest, followed by West Germany, Japan, and the United Kingdom. Chemical industry employment has been relatively stable during the past ten years.

Chart 10.2
World Chemical Industry Output and Employment 1991

TABLE 10.1
WORLD CHEMICAL INDUSTRY OUTPUT (BILLION DOLLARS)

Item/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
World Chemical Industry Output	171.0	719.0	747.0	681.0	702.0	719.0	720.0	850.0	976.0	1115.0	1173.0	1230.0	1245.0	5.2%	7.9%	1.2%
United States	49.2	168.2	186.9	176.3	189.6	206.0	204.8	205.7	229.5	259.7	275.2	285.6	288.0	4.4%	7.0%	0.8%
Canada	2.5	9.6	11.1	11.6	12.6	13.1	13.4	13.4	15.0	17.8	19.5	19.7	19.1	5.6%	7.3%	-3.0%
Belgium/Luxembourg	1.7	16.6	15.3	14.1	13.2	13.6	14.1	17.2	19.8	22.7	25.0	25.5	26.0	5.4%	8.6%	2.0%
France	8.1	33.8	31.2	30.1	30.4	31.8	39.5	47.4	53.5	54.5	59.1	61.6	63.8	7.4%	6.1%	3.6%
Germany	13.6	59.3	51.7	48.5	49.7	49.4	50.5	64.5	78.2	85.7	91.0	92.5	94.2	6.2%	7.9%	1.8%
Italy	5.9	28.7	24.8	23.1	23.5	23.6	24.5	30.7	37.5	43.8	46.6	47.8	47.9	6.8%	9.3%	0.2%
Netherlands	2.4	14.4	13.6	12.5	13.1	13.6	13.9	16.0	19.5	22.4	24.0	23.3	23.0	5.4%	7.5%	-1.3%
Spain	n/a	17.8	16.2	15.7	14.1	15.2	16.1	20.7	25.8	30.4	33.0	34.8	34.2	7.8%	10.6%	-1.7%
Sweden	n/a	4.5	4.3	3.9	3.9	4.1	4.1	5.0	6.3	7.5	7.7	8.1	7.7	6.0%	9.0%	-4.9%
Switzerland	n/a	7.1	6.7	6.6	6.7	6.5	6.7	9.3	11.5	12.7	14.2	14.7	15.2	8.5%	10.3%	3.4%
United Kingdom	7.6	31.8	29.1	26.4	25.7	25.2	26.1	30.1	36.7	44.0	48.5	48.7	51.2	5.8%	11.2%	5.1%
Japan	15.3	79.5	81.9	74.1	81.0	84.9	85.9	113.9	134.3	160.2	160.8	163.3	165.0	7.3%	7.7%	1.0%
Rest of the World	n/a	247.7	274.2	238.1	238.5	232.0	220.4	276.1	308.4	353.6	368.4	404.4	409.7	4.1%	8.2%	1.3%

Sources: Bureau of the Census, CEFIC, CIA, Statistics Canada, CMA estimates

TABLE 10.2
CHEMICAL INDUSTRY PRODUCTION INDICES, SELECTED COUNTRIES (1985=100)

Country/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
United States	61.2	96.1	97.6	89.5	95.7	100.0	100.0	103.5	109.4	115.3	118.7	120.5	121.3	2.2%	3.2%	0.7%
Belgium/Luxembourg	51.2	84.5	85.4	96.9	90.6	97.0	100.0	102.6	110.6	120.2	124.9	128.4	129.9	4.3%	4.8%	1.2%
France	53.0	86.0	86.0	86.4	93.5	98.3	100.0	101.0	104.1	111.4	118.2	120.3	123.7	3.7%	4.1%	2.8%
Italy	53.6	91.2	88.2	88.1	91.2	96.8	100.0	101.4	103.6	112.5	115.0	117.1	115.9	2.8%	2.7%	-1.0%
Netherlands	42.2	75.2	75.8	75.6	82.9	91.7	100.0	100.0	104.0	112.0	118.0	120.0	120.0	4.7%	3.7%	0.0%
Spain	n/a	88.3	86.9	88.3	92.5	98.1	100.0	105.0	112.4	122.5	128.6	132.5	130.9	4.2%	4.5%	-1.2%
Sweden	n/a	87.7	96.0	91.9	99.3	100.5	100.0	99.3	106.3	119.6	115.0	118.5	109.0	1.3%	1.9%	-8.0%
Switzerland	n/a	81.4	84.8	83.8	89.2	94.1	100.0	102.1	105.3	109.4	119.0	119.6	120.6	3.6%	3.4%	0.8%
United Kingdom	67.1	83.3	83.3	83.8	90.3	95.8	100.0	101.5	108.8	113.9	119.3	118.2	121.9	3.9%	3.7%	3.1%
West Germany	64.1	91.3	91.0	87.4	93.6	98.5	100.0	99.2	101.0	106.5	109.4	112.4	114.8	2.4%	3.0%	2.1%
Japan	49.3	81.7	81.5	83.8	88.9	96.3	100.0	100.5	111.1	120.4	128.7	134.4	137.3	5.4%	6.4%	2.2%

Sources: Federal Reserve Board, CEFIC, CIA

TABLE 10.3
CHEMICAL INDUSTRY PRICE INDICES, SELECTED COUNTRIES (1985=100)

Country/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
United States	33.8	85.8	94.9	96.4	96.7	99.2	100.0	98.9	102.6	112.1	118.6	119.2	121.1	2.5%	4.1%	1.6%
Belgium/Luxembourg	43.3	69.0	76.3	86.9	92.2	96.5	100.0	97.7	94.0	96.5	102.1	98.8	98.1	2.5%	0.1%	-0.7%
France	25.9	65.2	74.4	81.0	87.7	95.6	100.0	98.8	96.3	98.8	103.2	103.2	103.2	3.3%	0.9%	0.0%
Italy	17.2	62.6	70.1	77.7	84.5	92.8	100.0	97.3	100.4	107.5	110.7	117.5	120.4	5.6%	4.4%	2.5%
Netherlands	44.4	81.3	93.0	92.7	93.5	94.3	100.0	85.4	87.0	88.0	92.0	89.0	87.0	-0.7%	0.4%	-2.2%
Spain	n/a	56.6	66.0	74.1	83.4	91.7	100.0	101.0	102.5	104.6	108.3	112.1	111.8	5.4%	2.1%	-0.3%
Sweden	n/a	64.3	70.0	77.4	87.1	94.5	100.0	101.6	103.2	110.5	116.0	118.0	122.0	5.7%	3.7%	3.4%
Switzerland	n/a	87.9	92.2	93.9	93.5	95.9	100.0	97.3	90.8	91.9	93.0	97.9	97.9	0.6%	0.1%	0.0%
United Kingdom	22.0	76.0	80.9	86.2	90.5	95.1	100.0	101.7	105.8	111.5	116.4	121.7	126.5	4.6%	4.5%	3.9%
West Germany	53.3	82.5	89.7	93.7	93.9	97.4	100.0	94.2	91.1	92.4	95.2	93.8	93.2	0.4%	-0.2%	-0.6%
Japan	50.3	107.9	105.8	104.5	102.5	101.4	100.0	91.5	92.5	89.9	91.4	92.5	93.5	-1.2%	0.4%	1.1%

Sources: Bureau of Labor Statistics, CEFIC, CIA, CMA estimates

TABLE 10.4
CHEMICAL INDUSTRY EMPLOYMENT, SELECTED COUNTRIES (THOUSAND EMPLOYEES)

Country/Year	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Annual Growth Rates 1991/81	1991/86	1991/90
United States	1049	1107	1109	1075	1043	1049	1044	1022	1026	1059	1076	1088	1072	-0.3%	1.0%	-1.4%
Belgium/Luxembourg	83	90	88	88	88	89	90	91	91	92	95	97	99	1.2%	1.7%	2.1%
France	310	297	285	280	275	274	272	269	268	257	264	263	265	-0.7%	-0.3%	0.8%
Italy	299	283	271	263	251	241	233	230	225	222	220	217	217	-2.2%	-1.2%	0.0%
Netherlands	97	91	91	90	88	89	89	91	91	92	92	93	92	0.1%	0.2%	-1.1%
Spain	n/a	244	244	243	242	241	240	239	239	239	240	240	240	-0.2%	0.1%	0.0%
Sweden	n/a	39	41	44	43	44	43	42	45	43	42	42	40	-0.2%	-1.0%	-4.8%
Switzerland	n/a	63	63	68	68	65	67	68	69	70	72	73	72	1.3%	1.1%	-1.4%
United Kingdom	440	420	383	367	345	343	339	328	336	320	323	324	303	-2.3%	-1.6%	-6.5%
West Germany	590	568	565	559	549	550	557	567	572	575	582	592	594	0.5%	0.9%	0.3%
Japan	456	410	408	405	402	396	395	396	391	392	396	397	400	-0.2%	0.2%	0.8%

Sources: Bureau of Labor Statistics, CEFIC, CIA, CMA estimates

TABLE 10.5
WORLD EXPORTS BY PRODUCT COMPOSITION (BILLIONS OF DOLLARS)
All Countries

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth 1981-90
All Commodities	1,664.4	1,556.2	1,529.9	1,630.9	1,676.9	1,855.9	2,197.8	2,571.9	2,757.3	3,202.8	7.5%
Non-Manufactures	650.5	581.8	548.1	563.9	551.7	491.7	549.2	592.2	647.0	754.5	1.7%
Manufactures	1,013.9	974.4	981.8	1,067.1	1,125.2	1,364.1	1,648.6	1,979.6	2,110.3	2,448.2	10.3%
Road Vehicles	125.9	123.7	127.6	140.7	156.6	195.1	231.2	255.2	263.3	306.6	10.4%
Chemicals	123.5	117.0	122.1	131.2	136.9	162.1	195.9	238.3	246.8	282.6	9.6%
Computers	28.8	30.6	37.9	48.8	53.7	66.5	84.9	104.4	110.3	125.3	17.8%
General Industrial Machinery	57.7	53.4	49.8	49.9	52.9	65.5	77.3	93.3	101.7	122.9	8.8%
Clothing	36.0	35.3	36.2	41.6	45.1	58.7	75.5	84.0	91.9	109.8	13.2%
Special Industrial Machinery	58.0	53.3	46.5	48.1	53.3	65.5	77.3	91.0	98.1	117.1	8.1%
Iron and Steel	64.5	59.5	52.1	57.2	60.2	63.7	70.0	91.3	98.1	103.3	5.4%
Other Transportation Equipment	46.5	45.8	43.4	43.3	42.9	45.6	53.4	70.8	77.5	104.5	9.4%

Source: CMA World Manufactures Trade Database

TABLE 10.6
WORLD EXPORTS BY PRODUCT COMPOSITION (PERCENT OF TOTAL)
All Countries

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Change 1981-90
All Commodities	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Non-Manufactures	39.1%	37.4%	35.8%	34.6%	32.9%	26.5%	25.0%	23.0%	23.5%	23.6%	-15.5%
Manufactures	60.9%	62.6%	64.2%	65.4%	67.1%	73.5%	75.0%	77.0%	76.5%	74.6%	13.7%
Road Vehicles	7.6%	7.9%	8.3%	8.6%	9.3%	10.5%	10.5%	9.9%	9.5%	9.6%	2.0%
Chemicals	7.4%	7.5%	8.0%	8.0%	8.2%	8.7%	8.9%	9.3%	9.0%	8.8%	1.4%
Computers	1.7%	2.0%	2.5%	3.0%	3.2%	3.6%	3.9%	4.1%	4.0%	3.9%	2.2%
General Industrial Machinery	3.5%	3.4%	3.3%	3.1%	3.2%	3.5%	3.5%	3.6%	3.7%	3.8%	0.3%
Clothing	2.2%	2.3%	2.4%	2.5%	2.7%	3.2%	3.4%	3.3%	3.3%	3.4%	1.2%
Special Industrial Machinery	3.5%	3.4%	3.0%	2.9%	3.2%	3.5%	3.5%	3.5%	3.6%	3.7%	0.2%
Iron and Steel	3.9%	3.8%	3.4%	3.5%	3.6%	3.4%	3.2%	3.5%	3.6%	3.2%	-0.7%
Other Transportation Equipment	2.8%	2.9%	2.8%	2.7%	2.6%	2.5%	2.4%	2.8%	2.8%	3.3%	0.5%

Source: CMA World Manufactures Trade Database

- Chemicals is an important part of world trade, about 88 percent of total world trade and 11.5 percent of world manufactures trade in 1991.

TABLE 10.7
COUNTRY SHARES OF WORLD MANUFACTURES EXPORTS AND IMPORTS (%)
MANUFACTURES, SITC 5-9

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	16.0%	15.0%	14.1%	14.2%	13.8%	11.6%	11.6%	12.1%	13.0%	12.0%	-4.0%
Canada	3.8%	3.9%	4.4%	4.9%	4.8%	4.2%	3.7%	3.6%	3.5%	3.2%	-0.6%
Japan	14.6%	13.9%	14.6%	15.6%	15.3%	15.1%	13.7%	13.2%	12.8%	11.5%	-3.1%
EC	46.9%	47.6%	46.3%	43.6%	44.2%	46.8%	47.3%	44.3%	44.4%	46.0%	-0.9%
West Germany	15.2%	16.0%	15.3%	14.3%	14.7%	16.3%	16.4%	15.0%	14.8%	15.0%	-0.2%
France	7.5%	7.2%	7.0%	6.6%	6.6%	6.8%	6.8%	6.4%	6.4%	6.8%	-0.7%
Italy	6.3%	6.4%	6.4%	6.0%	6.0%	6.4%	6.3%	5.8%	6.0%	6.2%	-0.1%
United Kingdom	6.9%	7.0%	6.4%	6.1%	6.2%	6.1%	6.3%	6.1%	6.1%	6.3%	-0.6%
Other Western Europe	8.2%	8.2%	8.2%	7.7%	8.3%	8.8%	8.9%	8.5%	8.0%	9.0%	0.8%
Asian NICs *	4.2%	4.9%	5.5%	6.3%	6.0%	6.3%	7.1%	8.9%	8.5%	8.1%	3.9%
EE - U.S.S.R.	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.0%	1.1%	0.0%
Developing Countries	5.1%	5.0%	5.6%	6.2%	6.2%	6.0%	6.4%	7.3%	7.6%	8.2%	3.1%
Latin America	1.6%	1.7%	2.0%	2.3%	2.3%	2.0%	2.1%	2.4%	2.4%	2.3%	0.7%
Rest of World	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.3%	1.0%	1.0%	1.1%	0.9%
Share of World Imports											
U.S.	15.0%	15.5%	17.7%	21.9%	23.0%	21.6%	20.0%	18.5%	18.1%	16.1%	1.1%
Canada	4.8%	4.2%	4.9%	5.6%	5.5%	4.9%	4.4%	4.6%	4.5%	3.9%	-0.9%
Japan	3.0%	3.0%	3.2%	3.5%	3.2%	3.2%	3.7%	4.3%	4.7%	4.5%	1.5%
EC	36.6%	36.8%	36.6%	34.3%	34.6%	38.3%	40.7%	39.7%	40.3%	42.5%	5.9%
West Germany	9.0%	8.9%	9.2%	8.5%	8.4%	9.5%	9.9%	9.3%	9.4%	10.5%	1.5%
France	6.5%	6.7%	6.3%	5.7%	5.7%	6.5%	6.9%	6.7%	6.7%	7.2%	0.7%
Italy	3.8%	3.8%	3.6%	3.7%	3.8%	4.2%	4.6%	4.5%	4.6%	4.9%	1.1%
United Kingdom	6.4%	6.7%	7.0%	6.6%	6.6%	6.7%	7.1%	7.5%	7.3%	7.1%	0.7%
Other Western Europe	8.1%	8.0%	7.9%	7.4%	8.1%	9.0%	9.3%	8.7%	8.3%	9.4%	1.3%
Asian NICs *	3.8%	4.2%	4.5%	4.7%	4.1%	4.5%	5.0%	7.1%	7.6%	7.1%	3.3%
EE - U.S.S.R.	2.5%	2.6%	2.6%	2.1%	2.1%	2.1%	1.9%	1.9%	1.7%	1.7%	-0.8%
Developing Countries	24.1%	23.1%	20.4%	18.2%	17.1%	14.7%	13.1%	12.8%	12.4%	13.1%	-11.0%
Latin America	6.6%	5.5%	4.0%	4.2%	4.1%	3.8%	3.5%	4.1%	3.4%	3.4%	-3.2%
Rest of World	0.7%	1.0%	0.9%	0.8%	0.7%	0.6%	0.7%	1.3%	1.0%	1.1%	0.4%

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

From 1980 to 1985, the U.S. share of world chemical exports declined and its share of world imports increased. Since 1985, the U.S. export share has remained relatively stable at levels well below those of 1981 and the import share has returned to about the 1981 level.

Chart 10.3
U.S. Shares of World Chemical Exports and Imports

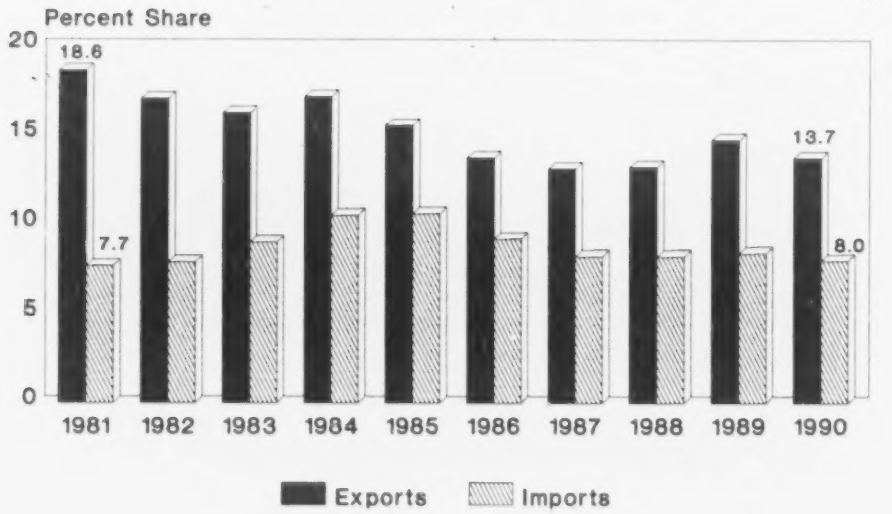


TABLE 10.8
WORLD CHEMICALS EXPORTS BY PRODUCT COMPOSITION (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth 1981-90
World Chemical Exports	123.5	117.0	122.1	131.2	136.9	162.1	195.9	238.3	246.8	282.6	9.6%
of which:											
51 Organic Chemicals	31.7	29.1	32.5	35.6	37.1	41.2	49.9	62.7	66.4	71.3	9.4%
52 Inorganic Chemicals	15.7	15.1	14.9	15.9	16.8	18.2	20.4	23.9	24.1	24.7	5.2%
53 Dyes, Tanning	7.2	7.0	7.2	7.3	7.7	10.2	12.8	15.1	15.9	19.0	11.3%
54 Medicinal, Pharmaceuticals	13.3	14.5	13.9	14.1	15.4	20.0	23.7	27.1	27.2	34.1	11.0%
55 Perfume, Cleaning	7.0	6.7	6.8	7.2	7.6	9.6	12.0	13.8	14.6	18.9	11.7%
56 Fertilizers, Manufacturing	7.1	5.9	6.1	7.2	7.4	7.4	8.4	10.1	9.7	10.8	4.8%
57 Explosives, Pyrotechnics	0.5	0.5	0.5	0.6	0.6	0.6	0.7	1.7	1.1	1.2	10.8%
58 Plastic Materials	24.7	23.8	25.6	27.7	28.1	35.6	45.0	56.4	59.4	69.1	12.1%
59 Chemical Materials NES	16.4	14.4	14.6	15.6	16.1	19.2	23.0	27.4	28.4	33.6	8.3%

Source: CMA World Manufactures Trade Database

TABLE 10.9
WORLD CHEMICALS EXPORTS BY PRODUCT COMPOSITION (PERCENT OF CHEMICAL EXPORTS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Change 1981-90
World Chemical Exports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
of which:											
51 Organic Chemicals	25.7%	24.9%	26.6%	27.1%	27.1%	25.4%	25.5%	26.3%	26.9%	25.2%	-0.5%
52 Inorganic Chemicals	12.7%	12.9%	12.2%	12.1%	12.3%	11.2%	10.4%	10.0%	9.8%	8.7%	-4.0%
53 Dyes, Tanning	5.8%	6.0%	5.9%	5.6%	5.6%	6.3%	6.5%	6.3%	6.5%	6.7%	0.9%
54 Medicinal, Pharmaceuticals	10.8%	12.4%	11.4%	10.7%	11.2%	12.3%	12.1%	11.4%	11.0%	12.1%	1.3%
55 Perfume, Cleaning	5.6%	5.7%	5.6%	5.5%	5.6%	5.9%	6.1%	5.8%	5.9%	6.7%	1.1%
56 Fertilizers, Manufacturing	5.7%	5.0%	5.0%	5.5%	5.4%	4.6%	4.3%	4.2%	3.9%	3.8%	-1.9%
57 Explosives, Pyrotechnics	0.4%	0.4%	0.4%	0.5%	0.4%	0.4%	0.4%	0.7%	0.4%	0.4%	0.0%
58 Plastic Materials	20.0%	20.3%	21.0%	21.1%	20.5%	22.0%	23.0%	23.7%	24.1%	24.4%	4.4%
59 Chemical Materials NES	13.2%	12.3%	12.0%	11.9%	11.8%	11.8%	11.7%	11.5%	11.5%	11.9%	-1.3%

Source: CMA World Manufactures Trade Database

TABLE 10.10
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

		EXPORTER							
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer
World	123.5	23.0	4.0	6.7	72.7	22.0	12.1	10.8	0.8	1.4
United States	8.7		2.4	1.0	3.4	1.1	0.6	0.6	0.2	0.7
Canada	3.3	2.6		0.1	0.5	0.1	0.1	0.1	0.0	0.0
Japan	5.5	2.4	0.2		1.5	0.6	0.3	0.2	0.4	0.2
EC	56.3	5.6	0.8	0.7	40.5	11.3	6.7	5.4	0.1	0.5
West Germany	11.2	0.9	0.1	0.2	7.8		2.0	0.9	0.0	0.1
France	9.3	0.7	0.2	0.1	6.4	2.4		0.8	0.0	0.1
United Kingdom	6.6	0.7	0.1	0.1	4.7	1.4	1.1		0.0	0.1
Asian NICs *	5.5	2.0	0.1	1.8	1.3	0.4	0.2	0.3	0.0	0.0
Latin America	8.8	4.9	0.2	0.2	2.9	1.0	0.5	0.4	0.0	
Other	35.4	5.5	0.4	2.9	22.7	7.3	3.8	3.7	0.1	0.1

Source: CMA World Manufactures Trade Database

TABLE 10.11
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

		EXPORTER							
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer
World	282.6	38.9	6.6	15.7	165.8	50.3	28.4	23.6	7.8	3.8
United States	22.9		4.5	2.5	9.6	3.1	1.5	2.0	1.1	1.9
Canada	7.8	6.1		0.1	1.2	0.4	0.2	0.3	0.1	0.0
Japan	13.9	4.6	0.3		4.5	2.0	0.8	0.7	1.3	0.3
EC	137.2	10.5	0.6	2.8	99.2	27.1	17.4	12.9	0.9	1.2
West Germany	28.6	1.8	0.1	0.8	19.3		4.7	2.7	0.2	0.3
France	23.0	1.1	0.1	0.3	17.2	6.2		2.5	0.1	0.2
United Kingdom	17.2	1.5	0.1	0.3	12.5	3.8	3.0		0.2	0.1
Asian NICs *	20.0	4.6	0.4	5.6	4.5	1.6	0.8	0.9	2.1	0.3
Latin America	11.6	6.2	0.2	0.3	4.0	1.3	0.9	0.6	0.1	
Other	69.2	6.9	0.7	4.4	42.8	14.8	6.9	6.2	2.2	0.2

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.12
COUNTRY SHARES OF WORLD CHEMICAL EXPORTS AND IMPORTS (% OF TOTAL)
SITC 5 CHEMICALS AND RELATED PRODUCTS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports:											
United States	18.6%	17.0%	16.2%	17.1%	15.5%	13.7%	13.1%	13.2%	14.7%	13.8%	-4.8%
Canada	3.2%	2.9%	3.0%	3.2%	3.0%	2.5%	2.4%	2.6%	2.6%	2.4%	-0.8%
Japan	5.4%	5.3%	5.6%	5.7%	5.5%	5.8%	5.9%	5.8%	5.9%	5.6%	0.2%
EC	57.6%	59.3%	59.0%	57.7%	58.8%	60.4%	61.1%	59.3%	58.4%	58.7%	1.1%
To External	26.6%	26.8%	27.1%	26.8%	27.1%	26.4%	25.8%	25.1%	24.5%	23.6%	-3.0%
West Germany	17.8%	18.1%	18.2%	17.8%	17.7%	19.3%	19.5%	18.3%	17.8%	17.8%	0.0%
France	9.8%	10.0%	9.7%	9.6%	10.0%	10.3%	10.4%	9.9%	9.7%	10.0%	0.2%
Italy	4.2%	4.5%	5.0%	4.7%	4.8%	4.4%	4.5%	4.3%	4.4%	3.9%	-0.3%
United Kingdom	8.8%	9.1%	8.6%	8.4%	8.9%	8.8%	8.8%	8.5%	8.2%	8.4%	-0.4%
Other Western Europe	8.6%	8.7%	8.9%	8.4%	8.7%	9.6%	9.9%	9.6%	8.8%	10.1%	1.5%
Asian NICs *	0.6%	0.9%	1.0%	1.2%	1.2%	1.3%	1.4%	2.3%	2.5%	2.7%	2.1%
EE - U.S.S.R.	1.9%	1.7%	1.8%	1.8%	2.0%	1.7%	1.5%	1.8%	1.4%	1.6%	-0.3%
Developing Countries	3.5%	3.5%	4.1%	4.5%	5.0%	4.5%	4.3%	5.1%	5.0%	5.1%	1.6%
Latin America	1.2%	1.2%	1.6%	1.9%	1.9%	1.4%	1.2%	1.4%	1.5%	1.4%	0.2%
Rest of World	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%	0.4%	0.5%	0.4%	0.1%
Share of World Imports:											
United States	7.7%	7.9%	9.0%	10.5%	10.6%	9.2%	8.2%	8.2%	8.4%	8.0%	0.3%
Canada	2.8%	2.7%	3.3%	3.4%	3.1%	2.8%	2.6%	2.7%	2.8%	2.6%	-0.2%
Japan	4.9%	5.4%	5.6%	6.0%	5.6%	5.6%	5.6%	5.7%	5.8%	5.1%	0.2%
EC	43.5%	44.2%	43.7%	42.5%	43.4%	46.3%	47.5%	45.3%	46.0%	47.6%	4.1%
From External	12.5%	12.4%	12.4%	12.1%	12.4%	12.8%	12.9%	12.3%	12.7%	13.0%	0.5%
West Germany	9.7%	10.0%	10.0%	9.7%	9.9%	10.5%	10.6%	9.8%	9.8%	10.4%	0.7%
France	8.2%	8.0%	7.7%	7.4%	7.6%	8.1%	8.3%	7.9%	8.0%	8.4%	0.2%
Italy	5.6%	5.8%	5.9%	5.8%	6.0%	6.5%	6.7%	6.5%	6.6%	6.7%	1.1%
United Kingdom	5.8%	6.1%	6.2%	6.3%	6.2%	6.4%	6.7%	6.7%	6.6%	6.5%	0.7%
Other Western Europe	8.8%	9.1%	9.0%	8.3%	9.5%	9.9%	10.1%	9.8%	8.9%	10.4%	1.6%
Asian NICs *	4.3%	4.6%	4.9%	5.1%	4.6%	5.3%	5.8%	8.4%	9.0%	8.2%	3.9%
EE - U.S.S.R	4.0%	3.7%	3.3%	3.1%	3.3%	3.1%	3.1%	2.9%	2.7%	2.4%	-1.6%
Developing Countries	22.6%	21.0%	19.8%	19.3%	18.1%	16.2%	15.4%	15.1%	14.2%	14.6%	-8.0%
Latin America	7.0%	6.3%	5.4%	5.6%	5.3%	5.0%	4.5%	4.1%	4.2%	3.9%	-3.1%
Rest of World	0.2%	0.3%	0.3%	0.4%	0.4%	0.4%	0.3%	1.4%	1.1%	1.1%	0.9%

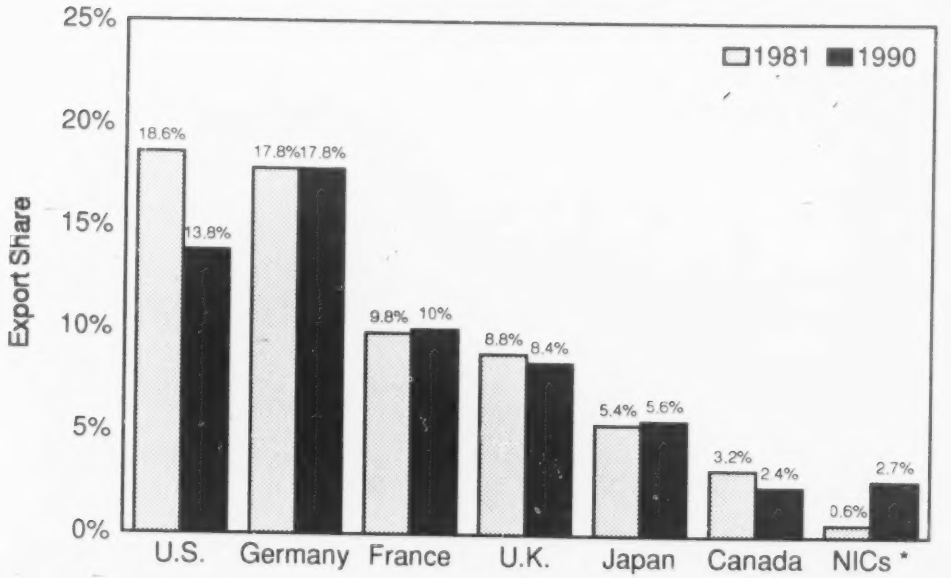
Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

The U.S. share of world chemical exports declined by nearly 5 percentage points while other developed nations maintained their export shares. Export share lost by the U.S. has gone to Asian NIC's and developing nations.

Chart 10.4

Chemical Export Shares

1981 & 1990



* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, And Singapore

TABLE 10.13
U.S. SHARE OF WORLD CHEMICAL IMPORTS AND EXPORTS (%)

	Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Chemicals And Rel. Prod. SITC 5	Export Share	18.6%	17.0%	16.2%	17.1%	15.5%	13.7%	13.1%	13.2%	14.7%	13.8%	-4.8%
	Import Share	7.7%	7.9%	9.0%	10.5%	10.6%	9.2%	8.2%	8.2%	8.4%	8.0%	0.3%
	Share Balance	10.9%	9.1%	7.2%	6.6%	4.9%	4.5%	4.9%	5.0%	6.3%	5.8%	-5.1%
Organic Chemicals SITC 51	Export Share	16.3%	16.1%	14.0%	14.7%	14.0%	13.2%	13.3%	13.5%	16.0%	14.6%	-1.7%
	Import Share	9.1%	9.0%	10.6%	11.7%	12.0%	9.7%	8.8%	8.7%	10.4%	10.1%	1.0%
	Share Balance	7.2%	7.1%	3.4%	3.0%	2.0%	3.5%	4.5%	4.8%	5.6%	4.5%	-2.7%
Inorganic Chemicals SITC 52	Export Share	20.4%	20.6%	20.5%	22.7%	19.6%	16.9%	15.3%	15.0%	17.9%	15.5%	-4.9%
	Import Share	13.8%	15.4%	16.5%	19.7%	18.7%	17.1%	14.0%	14.4%	14.2%	13.7%	-0.1%
	Share Balance	6.6%	5.2%	4.0%	3.0%	0.9%	-0.2%	1.3%	0.6%	3.7%	1.8%	-4.8%
Dyes & Tanning SITC 53	Export Share	7.5%	7.2%	7.1%	6.9%	6.1%	5.1%	5.0%	4.8%	6.7%	8.2%	0.7%
	Import Share	4.9%	4.8%	6.5%	8.3%	8.1%	8.1%	8.1%	6.7%	6.7%	6.4%	1.5%
	Share Balance	2.6%	2.5%	0.6%	-1.3%	-2.0%	-3.0%	-3.1%	-1.9%	-0.1%	1.8%	-0.8%
Medicinal, Pharm. Product SITC 54	Export Share	16.9%	16.3%	18.6%	19.3%	18.1%	16.1%	14.1%	15.1%	13.1%	11.7%	-5.2%
	Import Share	6.8%	6.7%	8.3%	10.3%	10.9%	10.2%	10.2%	11.4%	7.4%	7.0%	0.2%
	Share Balance	10.1%	9.6%	10.2%	9.0%	7.3%	5.9%	3.9%	3.7%	5.7%	4.7%	-5.4%
Perfume, Cleaning Etc. SITC 55	Export Share	14.1%	13.3%	12.5%	12.1%	10.8%	9.0%	8.5%	8.7%	10.1%	10.4%	-3.7%
	Import Share	5.7%	5.9%	7.4%	9.6%	10.5%	10.0%	9.0%	9.2%	7.9%	7.1%	1.4%
	Share Balance	8.4%	7.4%	5.1%	2.5%	0.3%	-0.9%	-0.5%	-0.5%	2.1%	3.3%	-5.1%
Fertilizers, Manufactured SITC 56	Export Share	24.5%	23.5%	20.9%	25.3%	29.0%	26.1%	27.0%	24.8%	29.2%	23.9%	-0.6%
	Import Share	16.5%	16.4%	16.9%	16.7%	13.8%	12.6%	10.3%	10.9%	11.5%	10.2%	-6.3%
	Share Balance	8.0%	7.1%	4.1%	8.6%	15.1%	13.5%	16.7%	13.9%	17.7%	13.7%	5.7%
Explosives SITC 57	Export Share	18.3%	19.0%	17.7%	24.1%	16.9%	12.6%	13.6%	5.3%	11.6%	11.8%	-6.5%
	Import Share	12.2%	7.3%	13.5%	14.6%	17.3%	17.3%	16.0%	5.0%	14.9%	13.4%	1.2%
	Share Balance	6.1%	11.8%	4.2%	9.5%	-0.4%	-4.7%	-2.4%	0.4%	-3.3%	-1.6%	-7.7%
Plastics Materials SITC 58	Export Share	15.2%	15.2%	14.4%	14.5%	11.4%	10.3%	10.4%	11.0%	13.4%	13.2%	-2.0%
	Import Share	3.1%	3.1%	4.3%	5.4%	5.6%	5.0%	4.3%	4.2%	5.7%	5.5%	2.4%
	Share Balance	12.1%	12.1%	10.1%	9.2%	5.9%	5.3%	6.1%	6.8%	7.7%	7.7%	-4.4%
Chemical Materials NES SITC 59	Export Share	32.2%	22.7%	21.7%	22.2%	20.1%	17.9%	16.7%	16.5%	15.7%	15.9%	-16.3%
	Import Share	5.2%	5.5%	5.5%	6.1%	6.8%	6.1%	6.2%	6.2%	5.7%	5.6%	0.4%
	Share Balance	27.0%	17.3%	16.2%	16.2%	13.2%	11.8%	10.6%	10.3%	10.0%	10.3%	-16.7%

Source: CMA World Manufactures Trade Database

TABLE 10.14
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Importer	World	US	Can.	EXPORTER Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	31.7	5.2	1.0	2.2	19.1	5.8	2.9	2.9	0.2	0.5	3.5
US	2.7		0.5	0.4	1.3	0.4	0.2	0.2	0.0	0.2	0.3
Canada	0.8	0.5		0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.7	0.6	0.1		0.4	0.2	0.1	0.1	0.1	0.1	0.3
EC	16.2	1.5	0.3	0.3	11.9	3.2	1.9	1.9	0.0	0.2	2.0
W Germ	3.1	0.1	0.0	0.1	2.4		0.6	0.3	0.0	0.0	0.5
France	2.0	0.1	0.0	0.0	1.5	0.5		0.2	0.0	0.0	0.4
U.K.	1.8	0.1	0.0	0.0	1.3	0.4	0.3		0.0	0.0	0.2
Asian NICs *	1.7	0.6	0.0	0.7	0.4	0.1	0.0	0.1	0.0	0.0	0.0
L Amer	2.3	1.2	0.0	0.1	0.7	0.3	0.1	0.1	0.0		0.2
Other	6.4	0.7	0.0	0.7	4.2	1.6	0.6	0.5	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.15
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Importer	World	US	Can.	EXPORTER Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	71.3	10.4	1.5	5.6	39.1	11.0	6.3	6.0	2.2	1.6	10.8
US	7.4		0.8	0.8	3.4	1.0	0.4	0.7	0.5	0.8	1.0
Canada	1.6	1.1		0.0	0.3	0.1	0.0	0.1	0.0	0.0	0.1
Japan	4.2	1.1	0.2		1.3	0.5	0.2	0.2	0.5	0.1	1.0
EC	34.6	3.0	0.2	1.3	23.9	6.1	4.1	3.7	0.3	0.4	5.5
W Germ	6.7	0.4	0.0	0.3	4.5		1.1	0.7	0.1	0.1	1.3
France	4.9	0.2	0.0	0.1	3.5	1.1		0.7	0.0	0.1	1.0
U.K.	3.9	0.4	0.0	0.1	2.6	0.7	0.7		0.1	0.0	0.7
Asian NICs *	6.9	1.9	0.2	1.9	1.2	0.3	0.2	0.2	0.4	0.2	1.0
L Amer	3.4	1.8	0.0	0.1	1.2	0.4	0.2	0.2	0.0		0.3
Other	13.3	1.5	0.1	1.4	7.9	2.6	1.2	1.0	0.4	0.1	1.9

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.16
COUNTRY SHARES OF WORLD CHEMICALS EXPORTS AND IMPORTS (%)
SITC 51 ORGANIC CHEMICALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	16.3%	16.1%	14.0%	14.7%	14.0%	13.2%	13.3%	13.5%	16.0%	14.6%	-1.7%
Canada	3.2%	3.1%	3.1%	2.9%	2.7%	2.0%	2.1%	2.3%	2.2%	2.1%	-1.1%
Japan	6.9%	7.0%	6.7%	6.7%	6.8%	7.6%	8.1%	7.8%	8.2%	7.9%	1.0%
EC	59.7%	59.0%	60.8%	59.7%	58.9%	59.1%	59.3%	57.1%	54.8%	54.9%	-4.8%
To External	23.2%	23.2%	25.0%	25.0%	24.5%	24.3%	23.9%	23.3%	22.0%	21.4%	-1.8%
West Germany	18.2%	18.9%	18.4%	18.0%	17.5%	18.2%	17.9%	16.7%	15.6%	15.5%	-2.7%
France	9.1%	5.6%	8.8%	8.8%	8.8%	9.3%	9.5%	8.7%	8.5%	8.8%	-0.3%
Italy	3.4%	4.6%	5.2%	5.1%	4.7%	4.0%	4.5%	3.9%	4.0%	3.3%	-0.1%
United Kingdom	9.2%	9.5%	9.0%	9.0%	9.6%	9.2%	9.3%	8.9%	8.3%	8.4%	-0.8%
Other Western Europe	7.7%	8.4%	7.8%	7.2%	7.5%	8.6%	8.5%	8.1%	7.5%	8.6%	0.9%
Asian NICs *	0.8%	0.8%	1.0%	1.5%	1.3%	1.4%	1.4%	2.1%	2.1%	3.0%	2.2%
EE - U.S.S.R.	2.0%	1.9%	1.9%	1.9%	2.3%	2.1%	1.8%	2.3%	1.8%	1.8%	-0.2%
Developing Countries	3.5%	3.6%	4.7%	5.4%	6.3%	5.7%	5.3%	6.4%	6.9%	6.7%	3.2%
Latin America	1.8%	1.7%	2.8%	3.3%	3.4%	2.1%	1.7%	1.9%	2.4%	2.3%	0.5%
Rest of World	0.1%	0.1%	0.2%	0.3%	0.3%	0.5%	0.4%	0.6%	0.7%	0.8%	0.7%
Share of World Imports											
U.S.	9.1%	9.0%	10.6%	11.7%	12.0%	9.7%	8.8%	8.7%	10.4%	10.1%	1.0%
Canada	2.5%	2.3%	2.7%	2.8%	2.7%	2.5%	2.3%	2.1%	2.1%	2.1%	-0.4%
Japan	5.7%	5.7%	6.4%	6.6%	6.3%	6.7%	6.8%	7.0%	6.7%	5.9%	0.2%
EC	50.0%	50.2%	47.4%	46.0%	46.4%	48.0%	48.5%	44.9%	45.4%	47.0%	-3.0%
To External	13.2%	13.3%	12.5%	12.9%	13.2%	13.6%	13.2%	12.4%	13.1%	13.8%	0.6%
West Germany	11.3%	11.1%	10.7%	10.2%	10.5%	10.7%	10.8%	9.5%	10.0%	10.4%	-0.9%
France	7.7%	7.9%	7.4%	7.1%	7.1%	7.4%	7.8%	7.0%	6.9%	7.6%	-0.1%
Italy	6.4%	6.9%	6.5%	6.5%	6.9%	7.4%	7.1%	6.5%	6.8%	6.9%	0.5%
United Kingdom	6.6%	6.7%	6.7%	6.9%	6.4%	6.3%	6.5%	6.3%	6.1%	6.1%	-0.5%
Other Western Europe	7.5%	7.9%	7.3%	6.8%	8.0%	8.1%	8.0%	8.0%	6.9%	8.4%	0.9%
Asian NICs *	5.1%	5.8%	6.2%	6.5%	6.1%	7.5%	8.5%	12.5%	13.0%	11.6%	6.5%
EE - U.S.S.R.	3.5%	3.0%	2.8%	2.7%	2.8%	2.7%	2.8%	2.4%	2.3%	1.7%	-1.8%
Developing Countries	15.7%	15.1%	15.6%	15.5%	14.5%	13.7%	13.1%	12.6%	11.7%	12.7%	-3.0%
Latin America	6.9%	6.4%	5.7%	6.4%	6.0%	5.7%	5.2%	4.4%	4.4%	4.5%	-2.4%
Rest of World	0.1%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	1.6%	0.9%	0.9%	0.8%

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.17
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	15.7	3.2	1.1	0.7	7.2	2.0	1.9	1.1	0.1	0.4	2.9
US	1.9		0.7	0.1	0.5	0.2	0.2	0.1	0.0	0.3	0.3
Canada	0.4	0.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.0	0.5	0.0		0.2	0.1	0.1	0.0	0.0	0.0	0.1
EC	7.1	0.9	0.3	0.1	3.7	1.0	1.0	0.6	0.0	0.1	2.0
W Germ	1.4	0.3	0.0	0.0	0.6		0.2	0.1	0.0	0.0	0.4
France	1.8	0.2	0.2	0.0	0.5	0.2		0.1	0.0	0.0	0.9
U.K.	1.0	0.1	0.1	0.0	0.6	0.1	0.3		0.0	0.0	0.1
Asian NICs *	0.4	0.1	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0
L Amer	1.1	0.7	0.0	0.0	0.4	0.1	0.0	0.0	0.0		0.0
Other	3.8	0.7	0.1	0.3	2.3	0.6	0.6	0.3	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.18
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	24.7	3.8	1.3	1.1	12.4	3.6	3.1	1.7	0.4	0.8	4.8
US	3.3		1.1	0.1	1.1	0.4	0.2	0.2	0.0	0.5	0.5
Canada	0.6	0.5		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	2.2	1.0	0.0		0.6	0.2	0.3	0.1	0.1	0.1	0.4
EC	10.6	0.8	0.1	0.1	7.0	1.7	2.0	0.8	0.0	0.2	2.4
W Germ	2.4	0.2	0.0	0.0	1.4		0.4	0.2	0.0	0.0	0.6
France	2.0	0.1	0.0	0.0	1.1	0.4		0.1	0.0	0.0	0.7
U.K.	1.5	0.1	0.0	0.0	1.1	0.3	0.4		0.0	0.0	0.2
Asian NICs *	1.7	0.4	0.0	0.4	0.4	0.2	0.1	0.1	0.1	0.0	0.3
L Amer	1.0	0.7	0.0	0.0	0.3	0.1	0.0	0.0	0.0		0.0
Other	5.4	0.6	0.1	0.4	3.0	1.0	0.5	0.4	0.2	0.0	1.2

Source: CMA World Trade Manufactures Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.19
COUNTRY SHARES OF WORLD CHEMICAL EXPORTS AND IMPORTS (%)
SITC 52 INORGANIC CHEMICALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	20.4%	20.6%	20.5%	22.7%	19.6%	16.9%	15.3%	15.0%	17.9%	15.5%	-4.9%
Canada	7.3%	6.0%	6.0%	6.9%	6.5%	6.4%	5.9%	6.0%	7.4%	5.4%	-1.9%
Japan	4.2%	4.1%	4.3%	3.8%	3.7%	3.9%	4.3%	4.4%	4.6%	4.6%	0.4%
EC	45.0%	47.8%	46.4%	44.5%	48.5%	51.4%	52.2%	50.2%	47.1%	50.3%	5.3%
To External	22.8%	23.0%	23.8%	22.0%	23.6%	22.3%	22.6%	23.5%	21.5%	21.8%	-1.0%
West Germany	12.6%	13.3%	12.9%	13.2%	12.4%	14.0%	14.6%	13.1%	13.8%	14.6%	2.0%
France	12.0%	12.4%	11.0%	11.2%	14.0%	14.8%	15.2%	13.6%	10.9%	12.6%	0.6%
Italy	4.7%	5.1%	6.2%	3.5%	4.0%	2.7%	2.5%	2.4%	2.6%	2.1%	-2.6%
United Kingdom	7.3%	8.1%	7.1%	6.8%	7.5%	9.0%	8.9%	8.3%	6.9%	6.9%	-0.4%
Other Western Europe	4.7%	4.5%	4.9%	5.1%	5.4%	5.5%	6.0%	5.9%	5.6%	6.3%	1.6%
Asian NICs *	0.4%	0.6%	0.6%	0.7%	0.6%	0.7%	0.7%	1.2%	1.4%	1.6%	1.2%
EE - U.S.S.R.	6.0%	4.6%	4.9%	4.8%	4.6%	4.2%	4.4%	4.9%	3.4%	4.6%	-1.4%
Developing Countries	10.4%	10.3%	11.3%	11.4%	10.9%	10.6%	10.9%	11.8%	11.6%	11.6%	1.2%
Latin America	2.7%	2.9%	3.1%	3.4%	2.8%	2.2%	2.0%	2.5%	3.2%	3.1%	0.4%
Rest of World	1.5%	1.6%	1.0%	0.1%	0.2%	0.5%	0.5%	1.0%	1.1%	0.6%	-0.9%
Share of World Imports											
U.S.	13.8%	15.4%	16.5%	19.7%	18.7%	17.1%	14.0%	14.4%	14.2%	13.7%	-0.1%
Canada	2.2%	2.0%	2.3%	2.3%	2.2%	2.0%	1.9%	2.3%	2.7%	2.5%	0.3%
Japan	6.3%	8.4%	9.4%	11.2%	9.6%	8.9%	9.1%	9.4%	10.2%	9.6%	3.3%
EC	44.1%	40.5%	39.7%	38.6%	40.8%	44.6%	45.8%	41.9%	41.1%	41.5%	-2.6%
To External	20.7%	18.2%	19.1%	17.1%	17.1%	17.7%	19.2%	17.9%	17.0%	15.1%	-5.6%
West Germany	10.3%	10.9%	10.5%	10.6%	10.9%	11.2%	11.1%	10.4%	9.4%	9.6%	-0.7%
France	13.1%	9.3%	8.9%	8.8%	9.2%	10.3%	10.1%	9.4%	8.4%	8.3%	-4.8%
Italy	4.6%	3.7%	4.6%	3.4%	3.3%	3.8%	4.1%	3.8%	4.2%	4.1%	-0.5%
United Kingdom	5.8%	6.1%	5.6%	5.5%	6.5%	7.3%	7.6%	6.6%	6.8%	7.0%	1.2%
Other Western Europe	7.0%	7.3%	7.4%	6.4%	9.1%	8.0%	8.6%	9.2%	7.4%	9.6%	2.6%
Asian NICs *	2.5%	3.7%	4.8%	4.3%	4.1%	5.2%	5.4%	6.6%	7.6%	7.2%	4.7%
EE - U.S.S.R.	6.0%	5.4%	4.9%	4.3%	3.5%	2.7%	3.2%	3.1%	2.6%	2.1%	-3.9%
Developing Countries	16.6%	15.6%	13.8%	12.0%	11.2%	10.3%	10.8%	11.7%	11.8%	12.7%	-3.9%
Latin America	6.7%	6.3%	4.3%	3.8%	3.4%	3.2%	3.4%	3.6%	4.1%	4.0%	-2.7%
Rest of World	0.1%	0.1%	0.0%	0.3%	0.3%	0.4%	0.0%	1.1%	1.2%	1.3%	1.2%

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.20
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 54 MEDICINAL, PHARMACEUTICAL PRODUCTS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	13.3	2.3	0.2	0.3	8.1	2.1	1.4	1.7	0.1	0.2	2.2
US	0.7		0.0	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.1
Canada	0.3	0.2		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.1	0.4	0.0		0.4	0.2	0.0	0.1	0.1	0.0	0.2
EC	5.5	0.9	0.0	0.1	3.4	0.8	0.5	0.6	0.0	0.1	1.0
W Germ	1.1	0.1	0.0	0.0	0.6		0.2	0.1	0.0	0.0	0.3
France	0.8	0.2	0.0	0.0	0.4	0.1		0.1	0.0	0.0	0.2
U.K.	0.6	0.1	0.0	0.0	0.3	0.1	0.1		0.0	0.0	0.1
Asian NICs *	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
L Amer	0.9	0.3	0.0	0.0	0.4	0.2	0.1	0.1	0.0		0.1
Other	4.6	0.4	0.1	0.1	3.3	0.8	0.7	0.8	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.21
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 54 MEDICINAL, PHARMACEUTICAL PRODUCTS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	34.1	4.0	0.2	0.9	20.5	5.6	3.6	3.9	0.3	0.2	8.1
US	2.3		0.1	0.2	1.3	0.3	0.1	0.4	0.0	0.0	0.7
Canada	0.8	0.4		0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1
Japan	2.6	0.8	0.0		1.2	0.6	0.1	0.2	0.1	0.0	0.6
EC	15.4	1.7	0.1	0.3	9.4	2.3	1.6	1.8	0.1	0.1	3.8
W Germ	3.1	0.3	0.0	0.0	1.5		0.4	0.3	0.0	0.0	1.1
France	2.4	0.3	0.0	0.1	1.6	0.4		0.4	0.0	0.0	0.5
U.K.	1.8	0.2	0.0	0.0	1.2	0.4	0.3		0.0	0.0	0.4
Asian NICs *	1.0	0.2	0.0	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.2
L Amer	1.4	0.3	0.0	0.0	0.7	0.2	0.2	0.1	0.0		0.2
Other	10.6	0.6	0.0	0.2	7.2	2.0	1.6	1.1	0.1	0.0	2.5

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.22
COUNTRY SHARES OF WORLD CHEMICAL EXPORTS AND IMPORTS (%)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Item /Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	16.9%	16.3%	18.6%	19.3%	18.1%	16.1%	14.1%	15.1%	13.1%	11.7%	-5.2%
Canada	1.2%	1.1%	1.3%	1.2%	1.1%	0.9%	0.9%	0.6%	0.6%	0.6%	-0.6%
Japan	2.5%	2.1%	2.5%	2.5%	2.5%	2.6%	2.5%	2.6%	2.8%	2.5%	0.0%
EC	58.3%	61.9%	56.6%	56.9%	57.5%	58.0%	59.5%	57.8%	60.9%	60.2%	1.9%
To External	35.5%	34.9%	34.1%	34.2%	34.2%	33.7%	33.8%	32.4%	34.2%	32.6%	-2.9%
West Germany	15.9%	14.5%	15.3%	15.3%	15.4%	16.4%	17.1%	16.5%	16.6%	16.4%	0.5%
France	10.5%	17.6%	10.1%	9.9%	10.0%	10.0%	10.0%	9.5%	10.6%	10.7%	0.2%
Italy	5.2%	4.8%	5.1%	5.3%	5.6%	5.2%	5.0%	4.7%	5.0%	4.3%	-0.9%
United Kingdom	12.5%	11.8%	11.7%	11.6%	12.0%	11.2%	11.2%	10.9%	11.6%	11.4%	-1.1%
Other Western Europe	16.7%	15.0%	16.5%	15.6%	15.7%	17.5%	18.4%	18.5%	18.5%	21.2%	4.5%
Asian NICs *	0.8%	0.5%	0.9%	0.8%	1.1%	1.3%	1.2%	1.4%	0.9%	0.8%	0.0%
EE - U.S.S.R.	0.4%	0.4%	0.4%	0.4%	0.5%	0.6%	0.5%	0.6%	0.4%	0.4%	0.0%
Developing Countries	2.5%	2.2%	2.5%	2.6%	2.9%	2.8%	2.5%	3.6%	2.0%	3.4%	0.9%
Latin America	1.3%	1.1%	1.2%	1.3%	1.3%	1.4%	1.2%	1.5%	0.7%	0.6%	-0.7%
Rest of World	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.2%	0.1%
Share of World Imports											
U.S.	6.8%	6.7%	8.3%	10.3%	10.9%	10.2%	10.2%	11.4%	7.4%	7.0%	0.2%
Canada	2.8%	2.9%	3.3%	3.3%	2.7%	2.6%	2.5%	2.3%	2.4%	2.3%	-0.5%
Japan	8.5%	8.7%	8.6%	8.6%	8.2%	8.4%	8.6%	9.3%	9.5%	7.8%	-0.7%
EC	37.6%	37.0%	37.7%	36.8%	37.2%	39.4%	40.5%	40.1%	43.9%	44.9%	7.3%
To External	14.5%	14.4%	14.8%	14.4%	14.3%	15.0%	15.3%	15.2%	16.6%	17.3%	2.8%
West Germany	8.7%	8.5%	8.5%	8.4%	8.6%	9.1%	9.2%	8.6%	9.1%	9.3%	0.6%
France	5.3%	5.1%	5.2%	4.9%	5.0%	5.2%	5.5%	5.9%	6.9%	7.3%	2.0%
Italy	4.8%	4.8%	5.3%	5.5%	6.1%	6.5%	6.5%	6.9%	7.4%	7.7%	2.9%
United Kingdom	4.4%	4.8%	5.1%	5.0%	4.8%	4.9%	5.3%	5.3%	5.9%	5.6%	1.2%
Other Western Europe	10.3%	10.0%	10.1%	9.8%	10.6%	11.2%	11.8%	10.8%	11.0%	12.1%	1.8%
Asian NICs *	2.3%	2.9%	3.0%	3.2%	2.9%	2.9%	2.8%	3.4%	3.5%	3.3%	1.0%
EE - U.S.S.R.	1.8%	2.4%	1.7%	1.9%	1.9%	1.8%	1.6%	2.0%	2.2%	3.7%	1.9%
Developing Countries	28.9%	28.2%	26.1%	24.7%	24.2%	22.1%	20.3%	18.6%	17.9%	17.5%	-11.4%
Latin America	6.9%	6.6%	6.0%	6.2%	6.1%	5.7%	5.2%	4.2%	4.0%	3.8%	-3.1%
Rest of World	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.4%	0.4%	0.4%	0.4%

Source: CMA World Manufacturers Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.23
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 58 PLASTIC MATERIALS ETC

Importer	World	US	Can.	EXPORTER Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	24.7	3.8	0.3	1.9	16.6	5.4	2.2	1.6	0.3	0.0	1.9
US	0.9		0.2	0.2	0.4	0.2	0.1	0.1	0.1	0.0	0.0
Canada	0.7	0.6		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.5	0.3	0.0		0.1	0.1	0.0	0.0	0.1	0.0	0.0
EC	12.6	0.8	0.0	0.1	10.5	3.1	1.5	0.8	0.0	0.0	1.2
W Germ	2.9	0.1	0.0	0.0	2.3		0.5	0.1	0.0	0.0	0.4
France	2.0	0.1	0.0	0.0	1.8	0.7		0.1	0.0	0.0	0.1
U.K.	1.6	0.2	0.0	0.0	1.3	0.4	0.2		0.0	0.0	0.1
Asian NICs *	1.1	0.3	0.0	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
L Amer	1.4	0.9	0.0	0.1	0.4	0.2	0.1	0.0	0.0		0.0
Other	7.4	0.8	0.1	1.0	4.9	1.8	0.5	0.6	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.24
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 58 PLASTIC MATERIALS ETC

Importer	World	US	Can.	EXPORTER Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	69.1	9.1	1.5	4.4	42.6	14.0	5.6	3.9	3.2	0.6	7.7
US	3.9		1.1	0.7	1.2	0.5	0.2	0.2	0.5	0.2	0.3
Canada	2.2	2.0		0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Japan	1.6	0.7	0.0		0.4	0.2	0.1	0.1	0.4	0.0	0.1
EC	38.2	2.3	0.1	0.6	29.9	8.8	4.3	2.4	0.3	0.3	4.7
W Germ	8.9	0.3	0.0	0.2	6.6		1.3	0.6	0.1	0.1	1.6
France	6.3	0.2	0.0	0.1	5.4	2.1		0.5	0.0	0.0	0.6
U.K.	5.3	0.4	0.0	0.1	4.1	1.3	0.7		0.0	0.0	0.6
Asian NICs *	5.2	1.2	0.1	1.7	0.8	0.3	0.1	0.1	1.2	0.0	0.3
L Amer	2.2	1.6	0.0	0.0	0.5	0.2	0.1	0.0	0.0		0.0
Other	15.8	1.4	0.2	1.3	9.7	4.0	0.9	1.0	0.8	0.0	2.3

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.25
COUNTRY SHARES OF WORLD CHEMICAL EXPORTS AND IMPORTS (%)
SITC 58 PLASTIC MATERIALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	15.2%	15.2%	14.4%	14.5%	11.4%	10.3%	10.4%	11.0%	13.4%	13.2%	-2.0%
Canada	1.3%	1.4%	1.2%	1.4%	1.7%	1.8%	1.9%	2.5%	2.6%	2.1%	0.8%
Japan	7.7%	7.5%	7.9%	8.4%	8.0%	8.0%	7.6%	7.1%	6.7%	6.3%	-1.4%
EC	65.0%	64.8%	64.8%	63.4%	65.6%	66.6%	66.7%	64.7%	62.2%	61.7%	-3.3%
To External	25.5%	25.1%	25.1%	24.8%	24.9%	23.3%	22.2%	21.4%	20.0%	18.4%	-7.1%
West Germany	21.7%	21.4%	21.3%	20.8%	21.5%	22.7%	22.7%	21.6%	20.3%	20.3%	-1.4%
France	9.1%	8.4%	8.9%	8.7%	8.8%	8.7%	8.9%	8.8%	8.2%	8.2%	-0.9%
Italy	5.9%	6.1%	6.0%	6.1%	6.4%	6.4%	6.4%	6.2%	6.3%	5.2%	-0.7%
United Kingdom	6.4%	6.4%	5.8%	5.7%	6.1%	5.8%	5.7%	5.6%	5.5%	5.6%	-0.8%
Other Western Europe	7.6%	7.3%	7.5%	7.4%	7.7%	8.0%	8.3%	8.5%	7.4%	8.3%	0.7%
Asian NICs *	1.0%	1.5%	1.5%	1.8%	1.8%	2.0%	2.1%	3.0%	4.5%	4.6%	3.6%
EE - U.S.S.R.	1.2%	1.3%	1.2%	1.1%	1.2%	1.0%	0.8%	1.0%	0.8%	1.1%	-0.1%
Developing Countries	0.6%	0.7%	1.1%	1.6%	2.3%	2.3%	2.1%	2.3%	2.2%	2.9%	2.3%
Latin America	0.1%	0.2%	0.5%	0.8%	0.8%	0.8%	0.7%	0.7%	0.8%	0.8%	0.7%
Rest of World	0.1%	0.0%	0.1%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.1%
Share of World Imports											
U.S.	3.1%	3.1%	4.3%	5.4%	5.6%	5.0%	4.3%	4.2%	5.7%	5.5%	2.4%
Canada	3.4%	3.1%	3.9%	4.1%	4.0%	3.5%	3.2%	3.3%	3.5%	3.1%	-0.3%
Japan	2.5%	2.6%	2.5%	2.6%	2.5%	2.6%	2.4%	2.6%	2.6%	2.3%	-0.2%
EC	48.8%	49.4%	49.1%	48.5%	50.5%	53.5%	54.7%	53.7%	52.4%	54.7%	5.9%
To External	9.6%	9.6%	9.6%	9.7%	10.3%	10.5%	10.3%	10.3%	10.5%	11.3%	1.7%
West Germany	12.0%	12.1%	12.3%	11.9%	12.3%	13.1%	13.0%	12.6%	12.1%	13.1%	1.1%
France	8.5%	8.6%	8.1%	7.8%	8.2%	8.9%	9.1%	8.7%	8.6%	9.2%	0.7%
Italy	6.5%	6.8%	6.8%	7.2%	7.3%	7.8%	8.1%	7.8%	7.6%	7.7%	1.2%
United Kingdom	6.9%	7.3%	7.7%	7.6%	7.8%	7.9%	8.5%	8.9%	8.1%	8.0%	1.1%
Other Western Europe	11.4%	11.1%	10.8%	10.3%	11.2%	11.4%	11.4%	11.0%	9.9%	11.1%	-0.3%
Asian NICs *	4.4%	4.9%	5.5%	5.6%	4.7%	5.6%	6.6%	6.6%	8.7%	8.1%	3.7%
EE - U.S.S.R.	4.1%	3.4%	3.2%	2.9%	3.1%	2.8%	3.0%	3.0%	2.8%	1.9%	-2.2%
Developing Countries	20.8%	20.8%	19.3%	18.8%	16.9%	14.4%	13.3%	13.9%	12.6%	12.2%	-8.6%
Latin America	5.6%	5.0%	4.4%	4.2%	3.9%	3.6%	3.2%	3.1%	3.5%	3.1%	-2.5%
Rest of World	0.2%	0.3%	0.3%	0.3%	0.2%	0.1%	0.1%	0.8%	0.8%	0.9%	0.7%

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.26
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS NES

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	16.4	5.3	0.2	0.6	8.9	2.8	1.5	1.5	0.0	0.1	1.3
US	0.8		0.1	0.1	0.4	0.1	0.0	0.1	0.0	0.1	0.2
Canada	0.6	0.6		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.7	0.3	0.0		0.1	0.1	0.0	0.0	0.0	0.0	0.2
EC	6.2	0.8	0.0	0.1	4.8	1.6	0.8	0.6	0.0	0.0	0.4
W Germ	1.0	0.1	0.0	0.0	0.8		0.2	0.1	0.0	0.0	0.1
France	1.2	0.1	0.0	0.0	1.0	0.5		0.1	0.0	0.0	0.1
U.K.	0.8	0.1	0.0	0.0	0.6	0.2	0.1		0.0	0.0	0.1
Asian NICs	1.1	0.8	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
L Amer	1.4	0.9	0.0	0.0	0.4	0.1	0.1	0.1	0.0		0.1
Other	5.5	1.8	0.0	0.2	3.0	0.9	0.5	0.6	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.27
1990 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS NES

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	33.6	5.3	0.3	1.8	21.3	7.2	3.5	3.3	0.5	0.3	4.0
US	2.3		0.2	0.3	1.3	0.4	0.2	0.3	0.0	0.1	0.4
Canada	1.2	1.1		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.6	0.6	0.0		0.5	0.2	0.1	0.1	0.1	0.0	0.3
EC	16.3	1.6	0.0	0.3	12.2	4.0	2.1	1.7	0.0	0.1	2.0
W Germ	3.3	0.3	0.0	0.1	2.3		0.7	0.4	0.0	0.0	0.6
France	3.3	0.3	0.0	0.0	2.5	1.3		0.4	0.0	0.0	0.4
U.K.	1.9	0.2	0.0	0.0	1.5	0.5	0.3		0.0	0.0	0.2
Asian NICs	2.2	0.5	0.0	0.6	0.7	0.2	0.1	0.1	0.2	0.0	0.2
L Amer	1.5	0.8	0.0	0.0	0.5	0.2	0.1	0.1	0.0		0.1
Other	8.5	0.8	0.0	0.5	6.0	2.2	0.9	1.0	0.2	0.0	1.0

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

TABLE 10.28
COUNTRY SHARES OF WORLD CHEMICAL EXPORTS AND IMPORTS (%)
SITC 59 CHEMICAL MATERIALS NES

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share Change 1981-90
Share of World Exports											
U.S.	32.2%	22.7%	21.7%	22.2%	20.1%	17.9%	16.7%	16.5%	15.7%	15.9%	-16.3%
Canada	1.1%	1.4%	1.5%	1.4%	1.3%	1.5%	1.4%	0.8%	0.9%	0.9%	-0.2%
Japan	3.9%	4.6%	5.3%	5.2%	5.1%	5.2%	5.5%	5.7%	5.7%	5.3%	1.4%
EC	53.1%	59.9%	59.8%	58.9%	60.8%	63.4%	63.8%	63.3%	64.2%	63.6%	10.5%
To External	25.5%	28.8%	29.4%	29.4%	30.4%	30.1%	29.2%	29.2%	29.5%	27.2%	1.7%
West Germany	17.3%	19.3%	20.2%	19.8%	20.2%	22.5%	22.4%	21.3%	21.4%	21.6%	4.3%
France	9.4%	9.9%	10.0%	9.8%	9.9%	10.2%	10.2%	9.9%	10.3%	10.4%	1.0%
Italy	3.0%	3.5%	3.8%	3.8%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%	0.8%
United Kingdom	9.4%	11.0%	10.3%	10.1%	10.9%	10.4%	10.8%	9.5%	9.5%	9.8%	0.4%
Other Western Europe	5.6%	6.4%	6.6%	6.4%	6.8%	6.9%	7.5%	7.1%	6.9%	7.5%	1.9%
Asian NICs *	0.2%	0.6%	0.8%	0.9%	1.0%	0.9%	0.9%	1.4%	1.5%	1.6%	1.4%
EE - U.S.S.R.	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.7%	0.7%	0.8%	0.4%
Developing Countries	2.4%	2.3%	2.4%	3.0%	3.2%	2.6%	2.6%	3.2%	3.2%	3.5%	1.1%
Latin America	0.8%	0.8%	0.8%	1.2%	1.3%	0.9%	0.8%	1.0%	0.8%	0.8%	0.0%
Rest of World	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.3%	0.5%	0.5%
Share of World Imports											
U.S.	5.2%	5.5%	5.5%	6.1%	6.8%	6.1%	6.2%	6.2%	5.7%	5.6%	0.4%
Canada	3.8%	4.3%	4.6%	4.9%	4.5%	3.8%	3.3%	3.5%	3.9%	3.4%	-0.4%
Japan	4.9%	5.4%	5.3%	5.7%	5.5%	5.6%	5.4%	5.6%	5.9%	5.6%	0.7%
EC	36.8%	40.9%	41.2%	40.4%	41.5%	44.5%	45.9%	44.5%	44.8%	47.2%	10.4%
To External	9.4%	10.2%	10.0%	9.9%	10.5%	10.7%	11.4%	11.3%	11.5%	11.8%	2.4%
West Germany	6.5%	7.1%	8.0%	8.0%	8.8%	9.5%	9.5%	8.8%	8.7%	9.6%	3.1%
France	7.3%	8.1%	7.7%	7.5%	7.9%	8.6%	8.8%	8.8%	9.3%	9.8%	2.5%
Italy	5.3%	5.9%	5.8%	5.7%	5.6%	6.2%	6.8%	6.5%	6.2%	6.1%	0.8%
United Kingdom	5.3%	6.0%	5.9%	5.9%	5.9%	5.7%	6.0%	6.0%	6.0%	5.9%	0.6%
Other Western Europe	7.2%	8.1%	8.2%	7.5%	8.5%	9.2%	9.4%	9.0%	8.5%	9.8%	2.6%
Asian NICs *	6.6%	4.5%	5.0%	5.3%	4.9%	5.2%	5.7%	7.2%	8.8%	8.5%	1.9%
EE - U.S.S.R.	4.4%	4.8%	4.3%	4.3%	5.5%	4.9%	4.5%	3.6%	3.2%	2.8%	-1.6%
Developing Countries	30.2%	25.4%	25.0%	23.9%	21.1%	19.5%	18.9%	16.8%	15.5%	15.9%	-14.3%
Latin America	8.6%	8.0%	7.5%	7.5%	6.8%	6.4%	5.8%	4.8%	4.5%	4.1%	-4.5%
Rest of World	0.2%	0.3%	0.3%	0.7%	0.6%	0.5%	0.3%	2.9%	2.8%	1.1%	0.9%

Source: CMA World Manufactures Trade Database
* Asian Newly Industrialized Countries = Hong Kong, Taiwan, South Korea, and Singapore

Definition of the Chemical Industry

There is no single definition of the chemical industry for statistical purposes. Data in this handbook are cited on the basis on which they were published. To the greatest extent possible, data herein cover the Chemicals and Allied Products industry as defined by the Commerce Department's Standard Industry Code (SIC) 28. According to the *Standard Industrial Classification Manual*, SIC 28 includes both establishments producing basic chemicals and establishments manufacturing products by predominantly chemical processes. Establishments classified in this major group manufacture three general classes of products: (1) basic chemicals, such as acids, alkalies, salts, and organic chemicals; (2) chemical products to be used in further manufacture, such as synthetic fibers, plastic materials, dry colors, and pigments; and (3) finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps; or to be used as materials or supplies in other industries, such as paints fertilizers, and explosives.

Data on R&D funding, new plant & equipment expenditures, and finances of the industry, however, are reported on a company basis which differs in concept from data reported on an industry basis. Data reported on a company basis may include non-chemicals business activities by companies classified as chemical companies. For example, the new plant and equipment expenditure data collected by the Bureau of the Census will include investments by chemical companies for non-chemical assets and hence may overstate capital investment by the chemical industry. On the other hand, these data will not capture investments in chemical plants made by companies classified in other industries because their other activities are larger than their chemical business. For this reason, the gross investment data developed by the Bureau of Economic Analysis may be preferable in that it includes investments only for chemical assets but reflects these investments by both chemical and non-chemical companies.

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